

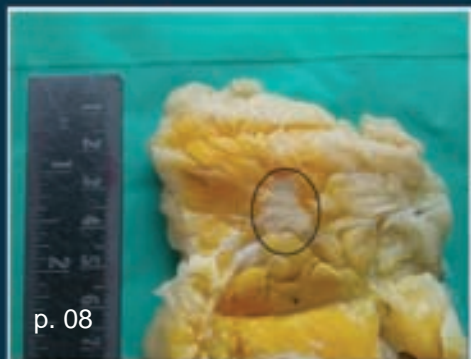
# PUSHPAGIRI MEDICAL JOURNAL

An International Journal



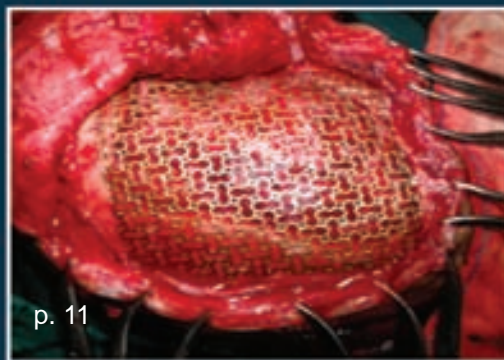
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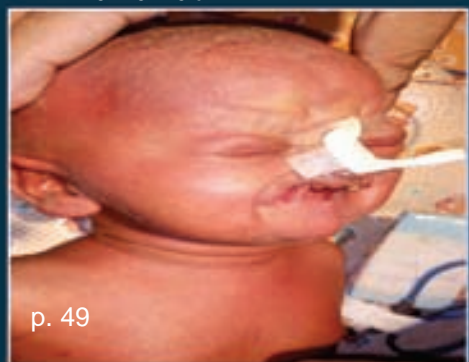
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Greyish white growth measuring  
1.5x1.5x1.5 cm



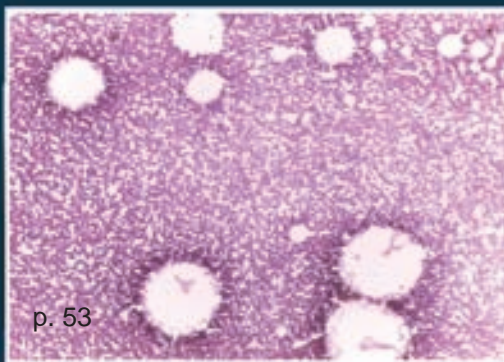
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FTP titanium mesh in situ



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Baby with features of Bartsocas syndrome



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Peripheral smear done for this patient  
showing fat vacuoles

# Pushpagiri Medical Journal



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## EDITORIAL

### High risk new born follow up and early intervention

The neonatal care in India has improved considerably in the last decades. Babies who would not have survived twenty years ago, are now surviving with all the technological advances in neonatal care. But what lies beyond survival for these babies? The main question now is whether mortality is being converted into survival with disability. The next question is how best these babies can be followed up, in the hospital setting and in the community, so that we help them to achieve maximum potential. Our own study on high risk new born follow up has showed the following findings (2002)<sup>1</sup>. The incidence of development delay and disability was 14.5% and 15.5% respectively in high risk new born. The commonest type of developmental disability was cerebral palsy (6.7%), seizure disorder (2.2%), deafness (2.2%) and blindness (1.1%). The common causes of high risk babies were low birth weight (52.2%), hyperbilirubinemia (46%), prematurity (40%), septicemia (27.7%), neonatal seizures (18.8%), neonatal asphyxia (15.5%) and hypoxic ischemic encephalopathy (12.2%).

The organization of follow up services in India has the challenges of a new medical frontier. In a country where nearly 70% of deliveries take place at home, the first hurdle is the identification of the high risk new born. After having identified the baby risk, either by a dai or auxiliary nurse midwife, another problem is the logistics of transport of this extremely sick baby to the hospital. The availability of adequate follow up services after discharge, is the next problem that has to be faced. Neonatal care is incomplete without adequate follow up. So both these avenues, neonatal intensive care and follow up services have to be developed together.

There are various methods of assessment of neurodevelopment of high risk new borns. We have to identify two types of screening tests, one which the health workers can use in the community like Trivandrum Development Screening chart (TDST) and one which the doctors can use in the hospital. When these tests raise the possibility of delayed development, the baby must be referred for a more detailed development test, like the Bayley Scales of Infant development test or Development Assessment Scale of Indian Infants (DASII). Today, only large institutions can offer these facilities. Also all babies should be screened for deafness (OAE) and preterm babies should be screened for Retinopathy of prematurity (ROP).

**Early Intervention:** Compensatory mechanism exists for all cerebral functions and this 'plasticity' of the brain is encouraged by stimulation and early intervention. High risk babies need extra stimulation compared to normal babies. Elaborate stimulation programmes have been devised in the west for these babies. We must develop simple, culture appropriate models with cheap items available in every home. Soft music from the radio and a plastic rattle for auditory stimulation, a red plastic ball for visual tracking and katori and spoon for refining the grasp, are some of the improvisations for stimulation that we have made in our unit.

It is said that if you are anticipating delay, you must start early. So vigilant monitoring for delay must be done and early intervention must be started immediately. A home based training programme must be developed. There is no doubt that the mother is the best therapist and the best teacher for the baby. It is not enough just to teach the mother how to do the various exercises. She must be taught the correct carrying pattern, the correct feeding and bathing pattern, the correct way of putting the baby to sleep, depending on the specific tone abnormalities. This attention to minor detail, goes a long way in improving the outcome of these babies.

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What should we try to do? The neonatologist has to realize that the developmental pediatrician , psychologist, occupational therapist, social worker and speech therapist have a very important role to play in the follow up services. The occupational therapist and social worker should start interacting with the mother right from the NICU, so that a feeling of camaraderie develops between them and the mother. The mother begins to feel that the whole team is working for the welfare of the baby. This not only boosts up her self- confidence, but ensure regular follow up. So a multidisciplinary approach has to be planned where in the high risk clinic, the various assessment and intervention, are interlinked. It would be ideal, if these were all available under one roof like a child development centre.

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## ✦ CASE SERIES ARTICLE

### Unusuals in Breast Pathology

### Part II: Carcinoma Breast with Apocrine Differentiation

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#### Abstract

Carcinoma of the breast with extensive apocrine differentiation constitutes fewer than 1% of breast cancers<sup>1</sup>. Apocrine carcinomas are defined as showing cytologic and immunohistochemical features of apocrine cells in greater than 90% of the tumor cells<sup>1</sup>. Here we report a case of an 80 year old female who presented with a breast lump which was diagnosed as carcinoma breast with apocrine differentiation.

**Keywords:** breast, apocrine carcinoma, invasive

#### Introduction

Any invasive carcinoma in which the cells show the cytological features of extensive apocrine differentiation is defined as carcinomas with apocrine differentiation<sup>[2]</sup>. They are indistinguishable clinically and radiologically from those without apocrine features and can present as a mass of any size at any site in the breast<sup>2</sup>.

#### Clinical Presentation

An 80 year old female presented with a lump in the right breast since 2 months. Physical examination revealed a 2x2 cm lump in the lower outer quadrant of the right breast. No palpable axillary lymph nodes were seen. Mammogram showed a highly dense radio-opacity with angular margins measuring 1.8x1.8x1.5 cm - BIRADS V. Fine needle aspiration cytology was reported as features suggestive of carcinoma breast. Wide excision of the breast lump was done and sent for frozen section for diagnosis and margin status. Infiltrating duct carcinoma breast with free margins was given as diagnosis. Later wide excision of the breast lump and Level I&II lymph nodes were processed for H&E sections. Gross examination revealed an oval piece of fibrofatty tissue measuring 7x5x4 cm. Cut section showed a greyish white growth measuring 1.5x1.5x1.5 cm (Fig.1). Level I & II lymph nodes were received as a nodular fibrofatty tissue measuring 7.5x7.5x3 cm in which 8 lymph nodes were identified.



Fig.1. Greyish white growth measuring 1.5x1.5x1.5 cm

Histopathological examination of the breast lump showed a neoplasm composed of cells arranged in large lobules and nests and in trabecular pattern (Fig.2a). Glandular and tubular patterns were also noted in focal areas. Sclerotic stroma separated the lobules and nests (Fig.2b). The neoplastic cells were large polygonal and clear cells which had abundant granular eosinophilic and foamy cytoplasm with vesicular nuclei and some showing prominent nucleoli (Fig.2c). Cytoplasm of the neoplastic cells showed Periodic Acid Schiff (PAS) positively (Fig.2d). No luminal secretions were seen. The cells showed minimal pleomorphism with no mitotic figures. The tumor was seen infiltrating upto the edge of resection margin. No tumor emboli seen. All the 8 lymph nodes showed reactive change with no evidence of metastasis. Immunohistochemical examination showed negativity for estrogen receptor, progesterone receptor and HER2neu (Fig.2e). A final diagnosis of invasive carcinoma breast no special type with apocrine differentiation was given with a Bloom Richardson Grade I.

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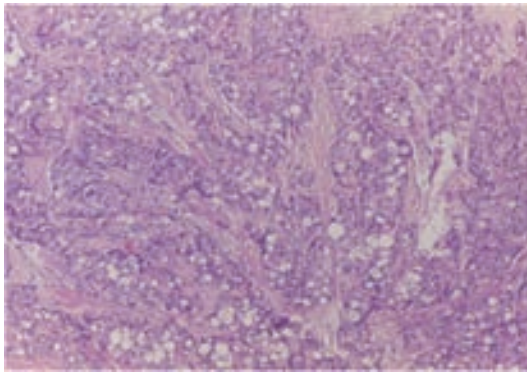


Fig.2a Neoplasm composed of cells arranged in large lobules and nests and in trabecular pattern (10X)

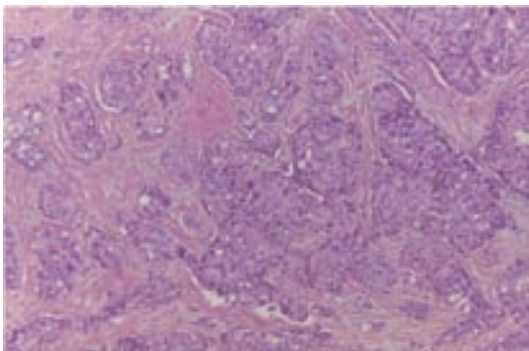


Fig.2b Sclerotic stroma separating the lobules and nests (10X)

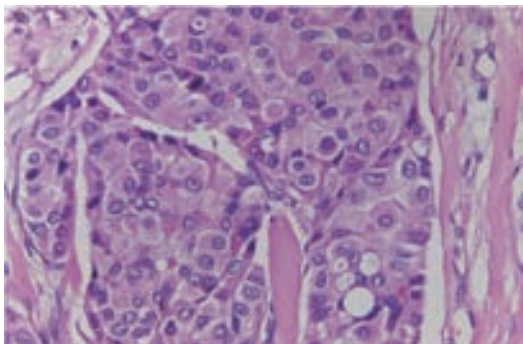


Fig.2c The neoplastic cells were large polygonal and clear cells which had abundant granular eosinophilic and foamy cytoplasm with vesicular nuclei and some showing prominent nucleoli (40X)

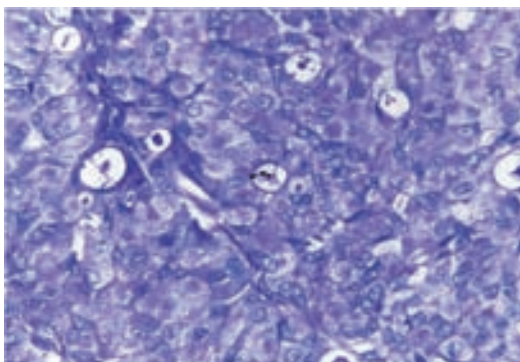


Fig.2d Periodic acid Schiff stain highlighting the granular cytoplasm of the neoplastic cell (40X)

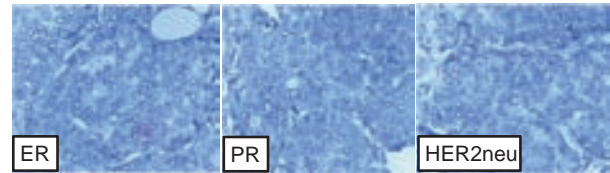


Fig.2e Immunohistochemistry showing negativity for ER, PR and HER2neu (40X)

## Discussion

Apocrine metaplasia is generally regarded as an indicator of low potential for a given lesion undergoing malignant transformation characterized by finely granular, pale eosinophilic cytoplasm, and a tendency to apical budding of the cytoplasm<sup>(3)</sup>. It is likely that preexisting benign apocrine epithelium can give rise to some apocrine carcinomas rather than de novo<sup>(3)</sup>. In 1916, Krompecher first described the malignant transformation of this apocrine epithelium<sup>(3)</sup>.

Patients usually present with a mass. Uncommon initial manifestations include Paget's disease, and nipple discharge<sup>(4)</sup>. Majority of the lesions are located in the upper outer quadrant<sup>(4)</sup>. Grossly no morphologic features are particularly associated with apocrine carcinoma<sup>(4)</sup>. These are firm to hard tumors with infiltrative borders<sup>(4)</sup>. Cut section of the tumor is generally grey or white with some cellular benign apocrine lesions showing a tan to brown colour<sup>(3)</sup>. Rarely they can be cystic or have a medullary appearance<sup>(4)</sup>.

Cytologic appearance of the tumor cells is the most distinguishing feature of apocrine carcinoma<sup>(4)</sup>. Neoplastic cells consist of two types. Type A cells resemble benign apocrine cells which are large cells bearing abundant eosinophilic granular cytoplasm that shows diastase resistant Periodic Acid Schiff (PAS) positivity, with round nuclei, and prominent nucleoli<sup>(2)</sup>. Cells with abundant foamy cytoplasm are type B cells<sup>(2)</sup>. A combination of type A and type B cells can also be seen. In 2005, Japaze et al proposed certain criteria that are as follows: (1) apocrine features consisting of 75% of cells (2) large cells with eosinophilic granular cytoplasm (3) nucleus to cytoplasmic ratio of 1:2 or more (4) large, round, and vesicular nucleus which may be pleomorphic and (5) sharply defined borders<sup>(3)</sup>. Clear cell variant of apocrine carcinoma will have an intense lymphocytic or lymphoplasmacytic reaction<sup>(4)</sup>. Invasive apocrine carcinoma in dense collagenous stroma will be difficult to identify, mistaking it for a granular cell tumor<sup>(4)</sup>.

Cytology will reveal highly cellular smears with cells having large pleomorphic nuclei, coarse irregular nuclear chromatin with macronucleoli & abundant granular eosinophilic cytoplasm.

Apocrine carcinoma of the breast is a distinctive malignancy with unique morphological and molecular features, generally characterized by being negative for estrogen and progesterone receptors, and thus not electable for endocrine

therapy. Apocrine carcinoma is similar to ductal NST but tends to be poorly differentiated<sup>(3)</sup>. Bilaterality is rare<sup>(2)</sup>. Majority of these tumors are negative for estrogen, progesterone receptors (ER and PR), HER2neu, and bcl2, but frequently express androgen receptor and GCDFP15<sup>(2)</sup>. Chromosomal gains of 1p, 1q, 2q and losses of 1p, 12q, 16q, 17q, and 22q has been revealed through comparative genomic hybridization<sup>(2)</sup>. Gene expression array analysis has identified an “apocrine molecular signature” which is characterized by increased androgen signalling and significant overlap with the HER2 group<sup>(2)</sup>. Studies have shown that carcinomas with apocrine differentiation have same clinical outcome as invasive carcinomas NST when matched for stage and grade<sup>(2)</sup>. Silico analysis using microarray – derived readings of two sets of prognostic genes, showed that carcinomas with apocrine differentiation had a high 21- gene recurrence score and a poor 70-gene prognosis signature, suggesting worse prognosis<sup>(2)</sup>.

## Conclusion

Apocrine carcinoma is a rare and distinct morphological type of invasive carcinoma of the breast

with worse prognosis. It is important to diagnose these tumors as a separate entity, as the androgen signalling associated with these tumors may lead to development of new therapeutic modalities in the future<sup>(2)</sup>.

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## ✦ ORIGINAL ARTICLE

# Intra-operatively contoured patient-specific Titanium implants for Primary Cranioplasty

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## Abstract

**Background:** Cranioplasty using titanium mesh is a commonly done surgical procedure in Neurosurgery. The optimum manner of the intervention would enable a cost-effective, ready to use, patient-specific implant which can be moulded intra-operatively. **Materials and methods:** Sixteen patients subjected to primary titanium mesh cranioplasty, the implant being contoured during the intervention, were subjected to a retrospective observational study. **Observations and Results:** The clinical outcome was measured based on the Glasgow coma scale, and showed remarkable improvement. There was no incidence infection, implant rejection, or bone resorption. The prognosis of the patients who had recurrent brain tumours was grim. **Conclusion:** Manual intra-operative contouring of titanium mesh implants showed good results after cranioplasty, provided the underlying neurological problem be amenable to therapy.

**Key Words:** Primary titanium mesh cranioplasty, intra-operative, manually contoured, patient-specific, decompressive craniectomy.

## Introduction

The use of Titanium mesh for emergency as well as planned cranioplasty is becoming increasingly common worldwide. Our experience with manually contoured titanium mesh implants, made specific for each patient intra-operatively, along with the detailed clinical scenarios is being discussed.

## Materials and methods

Sixteen patients who were subjected to primary cranioplasty using titanium mesh from January 2013 to December 2016 were subjected to a retrospective observational study, using the patient files retrieved from the medical records.

The titanium mesh used for the purpose were pre-sterilized, and during the operative procedure cut a little larger than the defect *per se*, and moulded manually so as to reproduce the contour of the calvarium of the specific patient. All demographic details, indications for cranioplasty, laterality, interval between craniectomy and cranioplasty, duration of hospital stay, and complications if any, were looked into.

## Observations and Results

The clinical scenarios of the sixteen patients were quite variable. Their age ranged from 20 to 78 years [mean=43.18 years]; only three patients were above 50 years of age. There were only three female patients [19%], and thirteen males [81%]. Of the three females two had brain tumours and the third had polytrauma, in an accidental fall from a height. Road traffic accidents contributed to the traumatic brain injury in ten out of the thirteen males [76.9%]. Two male subjects had brain tumours and one had suffered from an assault.

In nine patients out of the total sixteen [56%], cranioplasty was done in the same sitting as the craniectomy. Of these, six patients had TBI with compound/ comminuted fracture of the calvaria [representative case Fig: 1, 2].

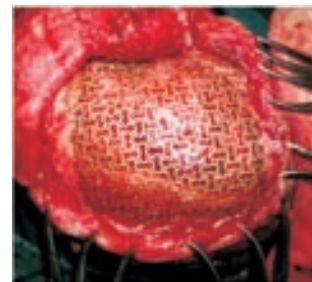


Fig. 1: FTP titanium mesh in situ



Three subjects had brain tumour, one each suffering from frontal convexity meningioma, glioblastoma, and recurrent parasagittal meningioma.



Fig. 2: Plain x-ray after titanium mesh cranioplasty

Among the seven patients in which cranioplasty was done after an interval [44%], one had recurrent torcular meningioma, and cranioplasty was done after an interval of more than ten years after the craniectomy done along with the primary tumour resection. In the remaining six patients who had TBI, the interval between decompressive craniectomy and cranioplasty ranged from 78 to 198 [mean=142] days.

The duration of hospital stay for cranioplasty was found to be relatively shorter in TBI [mean=8.4 days] as compared to brain tumours [mean=14.5 days], and this could probably be attributed to the associated brain pathology.

Cranioplasty was done in seven subjects on the right side, five on the left side, was bicoronal in two, and confined to occipital and suboccipital regions in one subject. It was unilateral, and fronto-temporo-parietal [FTP] in six patients, fronto-parietal in three patients, and parietal, frontal and fronto-parieto-occipital in one patient each [Fig. 3]. In a female subject who sustained polytrauma due to a fall from height, right decompressive craniectomy and evacuation of SDH with lax duralplasty, and left FTP craniectomy with evacuation of EDH, under GA, were done simultaneously on the day after admission. After six weeks she underwent FTP cranioplasty with autologous bone on right side and titanium mesh on left side in the same operation, and had uneventful post-operative period.

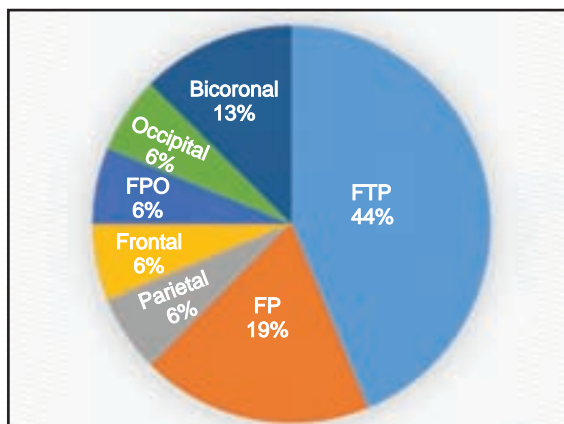


Fig. 3: Titanium mesh cranioplasty region-wise

A post-operative drain was inserted in every patient, which was removed on the third day as a routine. Four patients had considerable secretions, maximum being the one with 70, 180 and 26 ml on first, second and third post-operative days. The remaining twelve patients had only minimal collection.

Subdural/ subarachnoid/ intracerebral haemorrhage was never noted in any post-operative scan. Wound infection or wound dehiscence was never encountered. Postoperative seizures were encountered in five patients [31.25%], of which three had brain tumours. The patient with recurrent torcular meningioma developed *epilepsia partialis continua* and later tonic clonic seizures, and two patients with TBI had focal seizures. The problem was successfully managed in all the five subjects. Pneumocephalus was present pre-operatively in two patients with TBI [12.5%], and was managed conservatively. There was no incidence of post-operative pneumocephalus. Complications such as deep vein thrombosis, pneumonia, decubitus ulcers, etc., were not encountered.

One among the patient after 10 months of cranioplasty was admitted with abnormal movements, and diagnosed as post-traumatic hydrocephalus underwent ventriculo-peritoneal shunt.

Long term complications of the manually contoured titanium mesh such as incompatibility or infection or surrounding bone resorption or exposure of graft through scalp were never encountered in our study. The mean follow up period was 3-18 years after cranioplasty. None of the procedures could be considered as failed cranioplasty.

## Discussion

The most frequent indication for cranioplasty in our experience was traumatic brain injury. Whether the cranioplasty was for decompressive craniectomy in TBI, stroke etc., or for tumour resection, the intervention was done to protect the intracranial structures and their normal physiology, and to restore the appearance and stability of the skull<sup>1</sup>.

Redfern RM and team suggest that complications occurring from cranioplasty are commonly divided into those related to the operative procedure in general, and those specifically related to the particular material used. The commonest significant complication is infection [meningitis, abscess and sinus formation]. Infected autologous or alloplastic graft generally has to be removed and prolonged antibiotic therapy will be required. Inflammatory tissue reaction, loosening of the graft and exposure of the graft through the skin may occur, sometimes many years after implantation. Alloplastic materials can also result in erosion of the underlying bone, resulting in a large cranial defect<sup>2</sup>.

Prior to discussing the types and methods of cranioplasty, it is imperative for all concerned to consider some old golden rules. In *Annals of Surgery*, 1960, Wallace PB and Meirowsky AM

strongly suggest that in cases where delayed cranioplasty is being planned, certain points need to be stressed so as to avoid problems in cranioplasty, such as ensuring a full thickness skin cover, removal of all foreign material and bone fragments, and accurate dural repair<sup>(3)</sup>. According to FIS Juan *et al*, the success of reconstructive skull surgery depends upon the preoperative evaluation of the cranial defect, design and contour of the implant used, and the meticulous care in the surgical procedure<sup>(4)</sup>.

An ideal cranioplasty material shall be inert to the tissues, radiolucent, non-magnetic, non-corrosive, easily and accurately shaped, capable of getting moulded at the time of insertion, and shall have sufficient strength to resist fractures or deformation under pressure<sup>(2,5)</sup>.

Titanium was first used for cranioplasty in the 1940s<sup>(2)</sup>. Wiggins A and colleagues report that the use of titanium as the material for primary cranioplasty did not pose any significant risk to the patient prognosis even in the presence of skull fractures, scalp lacerations or proven local infections before cranioplasty. As per their observations, infection was significantly more common after titanium cranioplasty for large defects like hemicraniectomy and bifrontal craniectomy<sup>(6)</sup>.

In a study of cranioplasty comparing titanium and acrylic, Al Tamimi YZ *et al* grouped the cases into high and low risk groups, with trauma and stroke considered high risk indications, requiring titanium cranioplasty<sup>(7)</sup>. They conclude that titanium, being moulded pre-operatively has an additional advantage of convenience, but survival of acrylic appeared better.

Considering post-craniotomy surgical site infection (SSI) involving the bone, Kshetry and team prefer immediate titanium mesh cranioplasty at the time of craniectomy and debridement. This series demonstrated the safety and feasibility of performing immediate titanium cranioplasty in patients with postcraniotomy infections as well. This showed that in patients with risk factors for poor wound healing, immediate cranioplasty avoids many of the drawbacks, risks, and costs of delayed cranioplasty<sup>(8)</sup>.

Joshua J Wind and team suggest that surgical debridement, bone flap disposal and immediate titanium mesh cranioplasty form a suitable option for treatment of post-craniotomy infection. This strategy facilitates eradication of infectious sources and obviates the risks and costs associated with a second intervention<sup>(9)</sup>.

Multiple studies have demonstrated lower rates of infection in titanium mesh cranioplasties<sup>(10-14)</sup>. In another set of similar clinical scenarios for scores of years titanium spinal implants have been used for cases with spinal pyogenic and tuberculous osteomyelitis and discitis, without becoming sources of ongoing infections<sup>(15)</sup>.

Striking a difference of opinion with many contemporary authors certain clinical scientists like Bruce and Bruce advocate retention of the bone flap

itself for a delayed autologous bone cranioplasty<sup>16</sup>. But according to Spetzger U *et al*. removal of the bone flap without immediate cranioplasty could be associated with drawbacks like increased risk for trauma related brain injury and cosmetic deformity<sup>(17)</sup>. We however agree with the opinion that primary cranioplasty is the choice in most cases where the patient's general health, bone condition and neurological status permit the immediate intervention. But cases like decompressive craniectomy patients with poor neurological status, polytrauma, uncontrolled co-morbidities, etc., may need a considerable delay in the elective cranioplasty.

Alloplastic cranioplasty using materials like titanium mesh offer many advantages over autologous cranioplasty<sup>(17)</sup>, including unlimited availability, elimination of donor site morbidity, permanent shape and volume retention, and relative ease of multiplication during surgery, observe Spetzger U *et al*.

In current practice there are two primary methods of alloplastic cranioplasty: manual intra-operative contouring of the alloplastic cranioplasty material to fill the skull defect in situ; or use of prefabricated, patient specific implants, observe Sunderland IRP<sup>(18)</sup>. Simple skull defects are generally adequately reconstructed by manual intraoperative shaping of titanium mesh. However, accurate restoration of normal skull shape, especially if the facial skeleton is also badly involved, is exceedingly difficult. The same is the problem with large skull defects with complex geometry like fronto-temporo-zygomatic fractures. We have so far managed the too-distorted-calvarium group cranioplasty patients also with intra-operatively contoured titanium mesh, though the procedure is relatively time consuming.

Pre-fabricated patient-specific implants designed based on the CT images could precisely restore the missing Anatomical features in more complex cranial defects<sup>(18,19)</sup>. Such implants reduce operation time, minimize exposure to contamination, and have improved cosmesis and patient compliance.

M A Stoodley and colleagues state that poorly shaped prostheses are difficult to insert and secure. Any resultant deformity may lead to scalp necrosis and infection, hence the need for precision-fitting prosthesis by computer assisted designing of virtual implant models<sup>(20)</sup>.

In not too far a future, biodegradable implants could be used to provide immediate cover of the cranial defect<sup>(2)</sup>. These could release bioactive molecules to transform the perfectly fitted implant into living bone. The cost-effectiveness of such technologically advanced methods could pose serious limitations for their wider use.

## Conclusion

The study shows that immediate primary cranioplasty using titanium mesh is safe and feasible at



the time of craniectomy and debridement. At the same time in decompressive craniectomy with gross brain tissue involvement, a delayed cranioplasty is a better option. In either case manual intra-operative contouring of the titanium mesh is a financially viable method, with good patient outcome.

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## ✦ ORIGINAL ARTICLE

# Clinical course and postnatal outcome of antenatal hydronephrosis, on a selective population over a period of three years.

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## Abstract

**Background:** Antenatal hydronephrosis (ANH) is the most common congenital condition detected by prenatal ultrasound studies. All cases of ANH should be investigated with post-natal ultrasound scan. ANH does not necessarily imply obstruction, nor give any indication of function of the kidney. Antero posterior diameter (APD) of the pelvis at the level of renal hilum is the most studied parameter for assessing ANH in utero. **Aim:** The purpose of our review was to analyze the trends in the etiology, outcome and nature of the clinical course of the ANH cases presented to us from 2013 March to 2016 March. **Materials and methods:** A retrospective analytical study was performed on all the newly detected cases of antenatally detected hydronephrosis who presented to the Department of Paediatric and Neonatal surgery during the study period. Two hundred and sixty four cases of ANH were included in the study. Patients with ANH who were on follow-up during the study period, who presented before March 2013 is excluded from the study. Children of age more than three years who received treatment, and were on follow-up at other centers were excluded, due to the lack of exact clinical course details. The data collected included sex, severity of ANH, incidence of postnatal pathology, clinical course and the outcome. **Results:** 69.7 % of the patients were boys. 68% of the cases had mild ANH, and only 4% had an APD of more than 30mm. Majority of the babies with ANH had only transient hydronephrosis (63.8%) followed by pelvi-ureteric junction (PUJ) obstruction (18%). Surgical interventions were required for 9% of patients during the study period. **Conclusion:** ANH is contributed by various pathological and transient factors, hence the outcome in each patient may vary. Repeated USG in 4-6 weeks is the key to predict the outcome. A significant percentage of patients with ANH will have resolved renal pelvis dilatation postnatally. Reduced differential kidney function, abrupt decrease in baseline function or progressive increase in APD may indicate the need for early surgical intervention.

**Key Words:** Antenatally detected hydronephrosis (ANH), Renal pelvis APD, transient hydronephrosis

## Introduction

Inadequate drainage or retrograde flow of urine resulting in the dilatation of renal collecting system which can be detected by means of prenatal ultrasonography, refers to the term antenatally detected hydronephrosis<sup>1</sup>. This obstructive process may not be pathologic, but, instead, the result of normal development; however, if significant obstruction is present, nephrogenic tissue can be affected<sup>(2)</sup>. Fetal urine is the major component of amniotic fluid necessary for the normal lung development and prevention of compression abnormalities. ANH is the most common congenital condition that can be

detected by prenatal ultrasound scan. Most renal abnormalities are detected at 18-20 weeks of gestation<sup>(3)</sup>. This method of surveillance detects a significant fetal anomaly in 1% of pregnancies, of which 20-30% of cases are genitourinary in origin and 50% manifest as hydronephrosis<sup>(3,4,5)</sup>. Renal pelvis, calyces and ureters are normally not visualized in fetal ultrasound. A filled bladder and normal kidneys could predict an adequate renal function, but less accurately. Simple ultrasonography is the principal screening modality; however, the management, follow-up, and treatment remain an enigma in terms of its natural

clinical course and outcome. Patient selection, timing, fetal and maternal safety for fetal intervention also remains a plight. Bilateral obstructive lesions are more menacing than unilateral disease.

## Materials and Methods

A retrospective analysis of all newly detected cases of ANH presented to the Department of Paediatric and Neonatal Surgery at Pushpagiri Institute of Medical Sciences and Research Centre, Thiruvalla from 2013 March to 2016 March were undertaken. A total number of 264 patients who were detected to have ANH were included in the study. All patients underwent USG study by qualified radiologists at the institution. Postnatal ultrasound evaluation was initiated in the first 24 to 48 hrs of life for all suspected cases of severe ANH, megaureters, bladder outlet obstruction and those with palpable kidneys at birth. In rest of the patients, first postnatal USG was done within 7 days of life. All babies were strictly on follow-up with ultrasound scanning at every 4 to 6 weeks till late infancy and later less frequently based on the findings. Those patients with severe bladder outlet obstruction were managed promptly with surgical intervention. Babies with posterial urethral value (PUV) were managed with early cystoscopic fulguration of the valve. The intensity of subsequent evaluation was decided on the basis of renal pelvis APD. All babies with a postnatal APD more than 9mm were evaluated for vesicoureteric reflux (VUR) and lower urinary tract obstruction with the means of micturating cystourethrogram (MCU). Those with VUR were started on prophylactic antibiotics and circumcision was advised for all boys. Those patients with persisting or worsening APD more than 10 mm, in the absence of VUR underwent isotopic renogram diethylenetriamine-pentaacetic acid (DTPA) study. Patients with obstructed hydronephrosis and either reduced differential function less than 40% or its worsening on repeated evaluation were considered for surgical intervention. Babies with high grade reflux with progressive deterioration in renal function or breakthrough infections underwent surgical correction for VUR. Babies who showed resolution of hydronephrosis were kept on strict follow-up. A persistent APD less than 4mm were taken as the normal threshold during the study.

## Results

With the easy availability of the antenatal ultrasound screening, the number of ANH cases has increased in the last decade. The purpose of this study was to analyse the natural course, contributing etiological factors, management options and the final outcome of ANH patients presented to us in the study period. All patients had an APD above threshold for abnormal (4-5mm) which was detected antenatally. Out of 264 cases, 189 babies were referred to us from the peripheral hospitals. 69.7 % patients were boys (M-184 F-80). 68% of the patients had a maximum APD up to 10mm, 20% with APD 11 to 20mm, 8% with APD 21mm to 30mm (Fig.1) and only 4% had a maximum APD of

more than 30mm. Bilateral ANH was present in 12% of patients. Regular follow up in the postnatal period revealed transient hydronephrosis as the prime etiological factor constituting 63.8%. The second leading cause was identified as pelvi-ureteric junction obstruction consisting of 18% followed by VUR (11%) and PUV (1.2%). Other uncommon postnatal pathologies like uretero vescical junction obstruction, ureterocele, and dysplastic kidneys were also identified putting up to 6%. (Fig.2) Twenty four patients (9.1%) received surgical intervention for ANH during the study period. Eight patients underwent pyeloplasty for PUJ obstruction. Ureteric re-implantation was done for VUR on five patients, cystoscopic fulguration for PUV on four patients and cystoscopic procedures were done for ureterocele in two patients. One patient among the study group with severe bilateral ANH with PUV in renal failure having hydroureteronephrosis was immediately managed with bilateral ureterostomy followed by valve fulguration. Two patients with dysplastic kidneys with complications on follow up, had to undergo nephrectomy.

Spontaneous resolution of ANH was noted in 67% of the patients. Outcome of 24 % of patients are yet to be determined as they haven't showed spontaneous resolution or worsening, hence they are on regular follow up (Fig. 3). Antibiotic prophylaxis was started in all patients with VUR irrespective of their grades and 8% among them developed breakthrough infection. Commonly used antibiotics were cephalexin and cotrimoxazole. None of the male babies who underwent circumcision had developed breakthrough infections. Only five patients among the group had to undergo surgical correction for VUR.

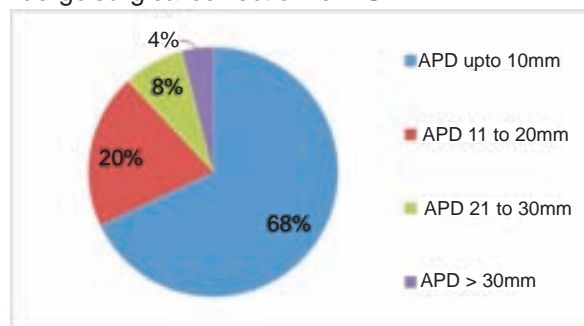


Fig 1: Distribution of APD in the study group

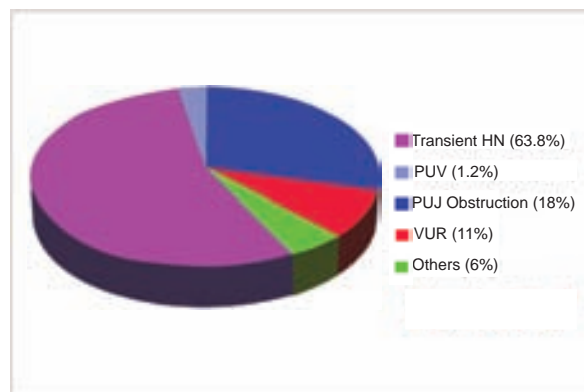
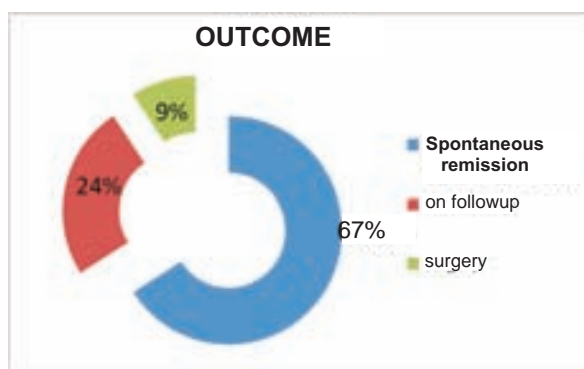


Fig 2 Incidence of the contributing pathology in the study group



## Discussion

Wide spread ultrasound screening during pregnancy has revealed an increased detection rate of ANH with a prevalence of 0.6-5.4%<sup>(6,7)</sup>. During the last decade, there is better understanding regarding its commonly encountered benign natural history and risk factors for postnatal pathology. It is essential to distinguish babies with significant postnatal pathologies that require long term follow up or surgery, from babies with transient hydronephrosis who requires no intervention.

Renal pelvis APD is the most widely assessed parameter for ANH. Even though APD can vary with gestation, maternal hydration and bladder distention; it is an objective parameter with small intraobserver and interobserver variation<sup>(8)</sup>. ANH is present if fetal renal pelvis APD is more than 4mm in second trimester and more than 7mm in third trimester<sup>(9)</sup>. In the presence of bilateral obstructive process, oligohydramnios is the best predictor of an adverse outcome<sup>(10,11)</sup>.

In a systematic analysis on 25 studies, Sidhu, *et al*<sup>(12)</sup> showed that isolated ANH resolved or stabilized in 98% patients with <12mm as compared to 51% with larger APD. Our study reveals spontaneous resolution in 63.8% of the group. Various studies have showed that patients with APD exceeding 10mm at once require close follow up<sup>(6,9,13-15)</sup>. Evaluation of the upper and/or lower urinary tract is limited to these patients and those showing worsening of renal pelvis APD, calyces or ureter or thinning of cortical parenchyma<sup>(16,17-20)</sup>. Radiological features of high grade obstruction with worsening of renal function were noticed in 10% of patients in follow up which is a similar finding among other studies<sup>(18-20)</sup>. Studies have shown that postnatally resolved hydronephrosis does not merit prolonged follow up and has a favorable outcome<sup>(22,23)</sup>, hence our patients with spontaneous resolution were kept on follow up for a period of one year before deciding on final outcome. Among the group of babies who had spontaneous resolution, there were no incidence of UTI or progression of hydronephrosis which is comparable to other studies<sup>(23)</sup>. Majority of the patients with mild hydronephrosis (renal pelvis APD <10mm) will have a near normal kidney function on long run and are less likely to have significant obstruction. Hence the intensity of evaluation for milder grades of hydronephrosis

has declined<sup>(24,25)</sup>. Prophylactic antibiotics were not given for babies with APD less than 15mm along with normal MCU, who were followed with clinical features, ultrasonography and UTI surveillance for a minimum period of one year. More than 90% of these babies showed complete resolution and frequent radiologic investigations or antibiotic prophylaxis were not required as compared to the studies by Coelho *et al*<sup>(26)</sup>, Alconcher *et al*<sup>(27)</sup> and Tombesi *et al*<sup>(28)</sup>. But evaluation and strict follow up is suggested for patients with APD exceeding 10mm and those showing increasing dilatation of renal pelvis, calyces or ureter, or thinning of cortical parenchyma<sup>(16,17,20)</sup>.

Guidelines from the Indian Society of Paediatric Nephrology (ISPN) on management of ANH were published in 2000 and later revised in 2013<sup>(29)</sup>. A significant proportion of ANH cases have transient HN that resolves in-utero or postnatally, and those with persistent HN require follow-up. Moderate to severe ANH cases should be screened for urinary tract obstruction or VUR. The initial evaluation aims to detect the patients with bladder obstruction, which requires prompt intervention. Decisions regarding surgical intervention, in other patients with obstructive hydronephrosis, depend on a combination of clinical and laboratory features, and results of sequential ultrasonography and diuretic renography<sup>(29)</sup>.

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## ✪ ORIGINAL ARTICLE

# Antimicrobial efficacy of common essential oils

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## Abstract

**Introduction** - Antibiotic overuse has led to widespread emergence of resistance. The medicinal properties of essential oils have been used in ayurvedic medicine for the treatment of various ailments. Oils with good antimicrobial activities can be considered as resources for producing safe alternatives to synthetic antimicrobials, and hence can be used to contain the spread of resistance. The aim of this study was to find out the antimicrobial activity of common essential oils against commonly encountered pathogens. **Materials and Methods** - Antimicrobial activity of commonly available 13 essential oils was tested by disc diffusion test. The following American type culture collection strains were used: *Escherichia coli* 25922, *Staphylococcus aureus* 29213, *Candida albicans* 90028, *Porphyromonas gingivalis* 33277. **Results** - Of the essential oils tested, cinnamon oil and lemon grass oil had the maximum zone of inhibition against all groups of microorganisms tested. Clove oil and eucalyptus oil also showed good antimicrobial properties but with limited spectrum. **Conclusions** - These oils can be developed into local agents for skin and mucosal application. Their safety levels need to be studied and the active ingredients can be incorporated into various drug formulations. The possibility of edible oils being used for infective gastrointestinal problems and also as food preservative can also be considered.

**Key words:** Essential oils, Antimicrobials

## Introduction

Spread of drug resistant microbes has urged us to lookout for newer agents with antimicrobial properties. Naturally occurring agents such as essential oils are known for its medicinal values and have been used since ages in home remedial measures as well as traditional medicine system such as Ayurveda. As these are naturally occurring and are used commonly in household activities they can be considered as safe alternatives to synthetic antimicrobials and their active ingredients may be developed to obtain newer antimicrobials, thus providing a natural and an alternative source in the race for development of newer antimicrobials.

Essential oils are aromatic oily liquids, which are obtained from various parts of the plant<sup>(1)</sup>. They contain various biologically active compounds which are responsible for the beneficial role. Chemically they are derived from terpenes and their oxygenated compounds<sup>(2)</sup>.

In this study antimicrobial potential of several commercially available essential oils were screened by disc diffusion test against various ATCC strains comprising gram positive and gram negative facultative anaerobe obligate anaerobes and yeast.

## Materials and methods

### Essential oils

The antimicrobial efficacy of the following oils were screened: Coconut oil, Castor oil, Sunflower oil, Sesame oil, Olive oil, Cinnamon oil, Clove oil, Lemongrass oil, Neem oil, Camphor oil, Eucalyptus oil, Mustard oil and Peppermint oil. These oils were purchased from the local market.



Fig. 1 – Antimicrobial activity of various oils on ATCC E. coli 25922

## Bacterial cultures

ATCC strains were obtained from the Department of Microbiology, Pushpagiri Institute of Medical Sciences and Research centre, Tiruvalla. The following ATCC strains were used representing each of the major classes of micro-organisms: Gram negative facultative anaerobes: *Escherichia coli* 25922; Gram positive facultative anaerobes: *Staphylococcus aureus* 29213; obligate anaerobes: *Porphyromonas gingivalis* 33277 and fungi (yeast-like): *Candida albicans* 90028.

## Media

Muller Hinton agar was used as the basic medium for sensitivity testing. Muller Hinton agar with methylene blue for *Candida albicans* and Brucella blood agar for *Porphyromonas gingivalis* were used.

## Screening of antibacterial activity

Disc diffusion method was used for screening of antimicrobial activity of each essential oil. Bacterial inoculum were adjusted to 0.5 McFarland standard correlating to  $1 \times 10^8$  colony forming units/ml and was spread evenly on to the surface of each agar plate. Sterile filter paper discs were placed on the surface of inoculated agar. To this filter paper, a drop of oil with the help of a sterile dropper was transferred. The plates were left for 30 minutes at room temperature to allow the diffusion of oil, and then were incubated for 24 hours at 37°C. After incubation period, the zones of inhibition were measured.

## Results

A total of thirteen essential oils commercially available in the local market were tested against standard strains representing various groups of micro-organisms. The results of the same were interpreted as per the zone of inhibition obtained by each of the standard strain against the corresponding oil. The detailed results are tabulated in Table 1.

Table no: 1 – Antimicrobial activity of various oils against the tested micro-organisms as demonstrated by the zone of inhibitions (in mm) around each essential oils

No	Essential oil	Zone of Inhibition (in mm)			
		E- coil	S.aureus	C.albicans	P.gingivalis
1	Cinnamon	27	33	50	35
2	Clove	7	8	17	18
3	Olive	7	8	6	6
4	Sunflower	7	6	6	8
5	Sesame	7	6	6	6
6	Coconut	7	6	6	6
7	Lemongrass	17	35	45	30
8	Neem	6	6	6	6
9	Peppermint	8	10	12	10
10	Castor	8	6	8	6
11	Camphor	8	6	6	6
12	Eucalyptus	30	30	14	13
13	Mustard	6	6	12	6

## Discussion

Essential oils have been used since ages in traditional medicine. Extracts from these oils can be used to prepare antimicrobial compounds<sup>(2)</sup>.

Various postulations on bactericidal and bacteriostatic activity of these organisms have been proposed:

- Hydrophobic nature of oil → separates the lipid of bacterial cell membrane and mitochondria → cell structure disrupted → Increase in plasma membrane permeability → massive ion leakage → bacteria dies<sup>(1,2)</sup>.
- They act by inhibiting microbial respiration<sup>(1,2)</sup>
- Inhibits germination of spores<sup>(3)</sup>

## Effect of various oils on microbial activity

In general, *Candida* spp and obligate anaerobes showed larger zones of inhibition when compared to facultative anaerobes. *Candida* spp. (06/13) and obligate anaerobes (05/13) were also found to be susceptible to more number of oils tested than the facultative anaerobes: *E.coli* (03/13) and *S. aureus* (04/13). Gram positive organisms: *S. aureus* and *Porphyromonas* spp. were found to be more susceptible to the essential oils when compared to gram negative organisms. This might be due to their different cell wall structure. Cell wall of gram positive bacteria is mainly made of peptidoglycan whereas that of gram negative is made of lipopolysaccharide, outer membrane protein and lipoprotein in addition to a thinner layer of peptidoglycan. (The antimicrobial activity of various oils on *E. coli* is shown in Fig. 1)

Knowing the spectrum of activity could help in further decisions regarding the application of these oils. For instance, oils or extracts from oils with good activity against yeasts and obligate anaerobes can be used in areas where infections by these organisms are more prone as in oral cavity.

## Anti-microbial spectrum of the various oils

Cinnamon oil and Lemongrass oil showed maximum zone of inhibition against all organisms tested. Gram positive organisms showed a larger zone of inhibition (>30mm) when compared to gram negative organisms. In general, all oils showed larger zone of inhibition for yeasts and obligate anaerobes with the exception of Eucalyptus oil whose zone diameter was more than double for facultative anaerobes (30mm) when compared to *Candida* spp (14mm) and *Porphyromonas* spp (13mm). Interestingly, clove oil showed only antifungal effects and good activity against obligate anaerobes. Fig. 2 & 3 shows the large zone of inhibition of cinnamon oil and lemongrass oil on *S.aureus* and *C.albicans* respectively.

The major active compound in Cinnamon oil is cinnamaldehyde. In the past, they have been used in treatment of various ailments<sup>(2,4)</sup>. For example, it has been used in the prevention of stomach ulcer due to its activity against *Helicobacter pylori*. It has also been

used in the treatment of oral candidiasis in HIV positive patients. Cinnamon oil has been used in vapour therapy to treat upper respiratory tract infections such as sinusitis and bronchitis. Probably due to its antimicrobial role it has also been used in the food industry in food preservation<sup>(2,4)</sup>.

Lemongrass is one of the main ingredients in Asian cuisines<sup>(5)</sup>. In Brazil, the tea made from its leaves is popular for its antispasmodic, anti-inflammatory, antipyretic and diuretic effects. The major constituent of this oil is citral which consists of two components: Citral A (*trans*-citral) and Citral B (*cis*-citral). It has been used in treatment of various ailments in Indian folk medicine<sup>(6)</sup> such as cough, elephantiasis, malaria and pneumonia<sup>(7)</sup>. Previous studies have shown that lemongrass oil inhibited biofilm formation as well as killed preformed biofilms<sup>(5)</sup>. Biofilms are secreted by the bacteria as a part of its survival process. Presence of biofilms prevent the access of antibiotics to the affected areas thus permitting uncontrolled growth of the bacteria. Lemongrass inhibiting biofilms has huge implications in device related infections and extracts of lemongrass may be incorporated in the devices to reduce incidence of device related hospital acquired infections. The activity of lemon grass against *Herpes simplex* virus has also been documented in previous studies<sup>(8)</sup>. It has also been used in preservation of food<sup>(9)</sup>.

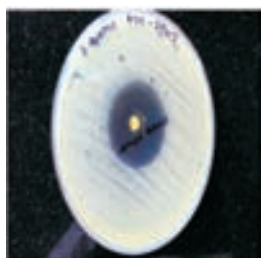


Figure 2 - Antibacterial activity of Lemongrass oil on *S. aureus* 29213



Figure 3 - Large zone of inhibition (50 mm) of Cinnamon oil on ATCC *Candida albicans* 90028

Extracts from eucalyptus has been used to alleviate respiratory tract symptoms. Its antimicrobial activity has been attributed to monoterpene, 1,8-cineole, linalool, pinocarveol,  $\alpha$ -terpineol and terpinen-4-ol<sup>(10)</sup>. Eucalyptus oil showed very good activity against both the facultative anaerobes (*E. coli* and *S. aureus*), >30mm of inhibitory zones but had minimal inhibitory effects on yeasts and obligate anaerobes.

Clove oil is commonly used as an antiseptic and analgesic in dental infections<sup>(11)</sup>. Its antimicrobial activity is attributed to eugenol, oleic acids and lipids<sup>(12)</sup>. Other properties exhibited by clove are antimutagenic, anti-inflammatory, antioxidant, antiulcerogenic, antithrombotic, antiparasitic and anti-inflammatory<sup>(13)</sup>.

In our study, olive oil, sunflower oil, sesame oil, coconut oil, neem oil, castor oil and camphor oil did not show any significant zone of inhibitions against the various groups of microbes tested, despite various publications stating antimicrobial activities of these oils

against pathogenic microbes<sup>(14,15)</sup>. The reason may be attributed to different brands of oils available in the market since each brand may have different purity levels of the raw ingredient which possess the antimicrobial activity. The composition of virgin oils versus processed may be different. In our study we used mainly processed oils except for coconut oil which was the virgin oil.

## Implications

This study suggests that cinnamon oil and lemongrass oil has the potential as an antimicrobial agent. These are low cost and naturally occurring agents and can be incorporated in soaps, sanitizers, topical preparations such as cream and lotions. Further studies are required to know the usefulness of these oils in various drug formulations.

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## ✦ ORIGINAL ARTICLE

### Misconceptions about Diabetes Mellitus among those attending a diabetic clinic in South Kerala

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#### Abstract

**Background:** Inadequate knowledge and misconceptions present significant barriers for effective management of Diabetes Mellitus (DM). It is important for physicians to understand the misconceptions among patients in order to improve patient care. As diabetes has emerged as a modern epidemic in India, understanding these patient beliefs can have an overall impact on general health. **Objectives:** 1) To determine the frequency and distribution of misconceptions about DM among diabetic patients. 2) To determine the association between the misconceptions and socio-demographic factors. **Methodology:** A cross-sectional study was conducted among 200 diabetic patients attending a diabetic clinic of a tertiary care hospital in South Kerala during a period of 2 months. A 25-item questionnaire was given to each of the participants. Misconception score was calculated and interpreted as very low (score<30), low (31-40), moderate (41-50), high (51-60) and very high (>60). Data was analysed using SPSS V.20 (©IBM). Chi square test was used to find the association of socio-demographic variables with the five categories of misconception scores. Rank correlations were also derived. **Results:** 101 (50.5%) study subjects belonged to 61 to 80 year age group. Only one individual (0.5%) exhibited very high level of misconceptions. 91 individuals (45.5%) had low level of misconceptions regarding DM. Commonest misconceptions were that bitter food can cure DM and oral hypoglycemic drugs contain insulin. Significant associations were found between misconception score and place of residence ( $p=0.034$ ), time since diagnosis ( $p=0.008$ ), and awareness regarding the disease ( $p<0.0001$ ). Education and occupation inversely affected the score of misconception ( $r = -0.49$  and  $r = -0.38$  respectively). Conclusion: Misconceptions regarding diabetes was low in the study population which could be attributed to high level of education and good occupation. Rural population had significantly higher level of misconceptions.

**Key words:** misconceptions, diabetes mellitus, cross-sectional study

#### Introduction

Diabetes Mellitus (DM) which was once a disease of developed countries has in recent times shown an increase in prevalence in developing countries like India<sup>(1)</sup>. Diabetes is now a major threat to community as it is diagnosed late, when complications have already set in<sup>(2)</sup>. It is estimated that by 2030, the number of diabetics in India would reach 80 million from 31 million in 2000<sup>(1)</sup>. Knowledge and awareness about DM and its complications are important to tackle the burden of diabetes, specially to improve treatment compliance<sup>(3,4)</sup>. With flourishing use of web based diabetes information system, the awareness and knowledge about signs and symptoms of diabetes, and prevention and treatment of diabetes and its

complications, is increasing worldwide. Kerala being a state with high literacy and information technology (IT) penetration, the extent of knowledge acquired through internet is wide enough to have a positive impact on health<sup>(5,6)</sup>. Even though sufficient information is available and people are aware of the health issues related to DM, efforts to put it into practice is less and there still exists a gap between awareness and practice. This emphasizes the need to enquire into what prevents them from good health practices. It is seen that myths and misconceptions related to DM prevention and treatment are to be known for effective management because, these affect people's lifestyle and treatment seeking behaviour. India being a country with cultural diversity,

there are many spiritual and alternative treatment practises and people present before modern medicine only at stage of emergencies<sup>(7)</sup>. These must be challenged and removed by scientific discourse and the physician must be able to identify and remove those false beliefs of patients<sup>(8)</sup>.

## Objectives

1. To determine the frequency and distribution of misconceptions about Diabetes Mellitus (DM) among diabetic patients
2. To determine the association between the misconceptions and socio-demographic factors.

## Methodology

A cross sectional study was conducted among 200 diabetic patients attending the diabetic clinic of a tertiary care hospital in Tiruvalla. The study was completed within a period of two months. By non-probability convenient sampling, all diabetic patients more than 18 years of age attending the various OPDs in the hospital were included. Non-cooperating, non-consenting and patients with any major physical or psychological illness likely to influence the response in the study were excluded. After obtaining informed written consent, a 25-item questionnaire was administered including misconceptions related to aetiology, types, pathogenesis, diet and treatment of DM. The questions had been selected by interviewing diabetic patients during a pilot study. The respondents were allowed to choose from three options. If they believed in a misconception they have to choose 'YES' with score of 3, or 'NOT SURE' with score of 2 and 'NO' with score of 1. The score for all 25 questions was added up and categorised. A total score greater than 51 was taken as high level of misconceptions, 41-50 moderate, <40 low. Data were entered into Excel (© Microsoft Corp.) and analysed using SPSS V.20 (© IBM Corp.). Descriptive statistics were calculated for quantitative data. Chi-Square test and rank correlation were done to find the association between misconception scores and various socio-demographic variables.

## Results

Out of the 200 diabetic patients majority were above 60 years (52%). 54.5% were females. Major proportion of the population were those who have received up to high school education (32%) and 43.5% of the population was unemployed. Majority were from rural areas (64.5%). (Table 1) Duration of clinically detected diabetes was less than five years in 76 participants (38%) and 17 participants were diabetic for more than 20 years with the mean period of diabetes in study population being 2.31 years. 55% of the study population had attended some form of diabetic awareness program.

Table 1 Socio-demographic characteristics (N=200)

Variables	Frequency
<b>Age (Years)</b>	
< 60	96 (48%)
> = 60	104 (52%)
<b>Sex</b>	
Male	91 (45%)
Female	109 (54.5%)
<b>Locality</b>	
Rural	129 (64.5%)
Urban	71 (35.5%)
<b>Education</b>	
Professional degree	28 (14)
Graduate	39 (19.5)
Intermediate / Post High school diploma	24 (12)
High School Certificate	64 (32)
Middle School	23 (11.5)
Primary school/ literate	21 (10.5)
Illiterate	1 (0.5)
<b>Occupation</b>	
Professional / Executive officers	14 (7)
Semi-professional	32 (16)
Clerical / Shop owner /Farm owner	30 (15)
Skilled worker	18 (9)
Semi-skilled worker	3 (105)
Unskilled worker	16 (8)
Unemployed	87 (43.5)

45.5% of the study population had low misconceptions about Diabetes Mellitus, 33.5% had very low misconceptions. Only 0.5% had very high misconception level. The most common misconception was that bitter food can cure diabetes, followed by oral hypoglycaemic drugs contain insulin and oral drugs have many side effects. The least common misconception was that diabetes is due to past sins. (Fig. 1)

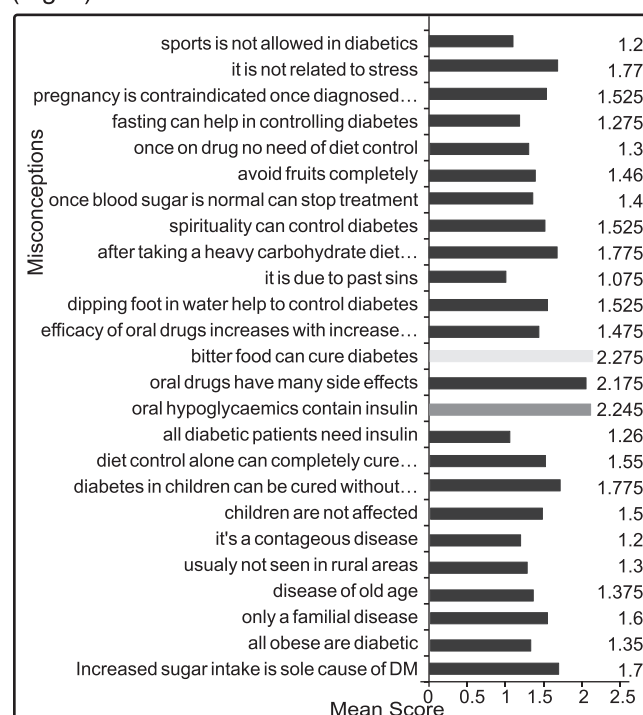


Figure 1. Misconceptions and their mean scores



Table 2. Association of misconceptions and demographic variables

Variables	Low	Moderate	High	Total (%)	p value
Age (Years)					
< 60	75	17	4	96 (48)	0.55
>= 60	83	14	7	104 (52)	
Gender					
Male	73	13	5	91 (45.4)	0.91
Female	85	18	6	109 (54.4)	

The level of misconceptions was found to be significantly more for rural population ( $p=0.034$ ). For both the rural and urban population, majority had very low to low misconceptions. (Fig. 2)

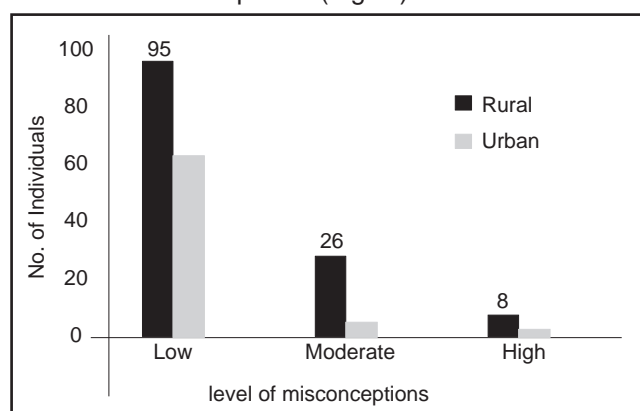


Figure 2. Place of residence and misconceptions

Higher scores were in those with longer diabetic history and lower scores in those with short duration of diabetes and this difference was found to be significant ( $p=0.008$ ). Participation in some form of diabetic awareness programme had helped in removing many misconceptions ( $p<0.0001$ ). Higher education and better occupation was associated with low level of misconceptions ( $r = -0.49$  and  $r = -0.38$  respectively).

## Discussion

Understanding the myths and misconceptions held by the people regarding Diabetes Mellitus (DM) is vital, so as to plan treatment and follow up strategy adequately and to improve compliance in treatment. This will lead to a decrease in morbidity due to DM as ignorance and unhealthy practises are one of the root causes for the present alarming rise in the proportion of DM patients. Often people misinterpret the symptoms and signs of complicated disease and hence report late for treatment. Treatment plan should hence include a component of awareness creation and clarification of doubts raised by the patients.

Misconceptions vary according to region, religion, socioeconomic status and hence a categorization of misconceptions based on these factors is needed. A study conducted in North India in 2009 found that 'eating more sugar causes DM' was the very

common misconception. The study participants included both diabetic and non-diabetic patients and it was found that non-diabetic individuals had significantly high level of misconceptions on diabetes. Female gender, low educational status were other factors associated with high level of misconceptions<sup>(7)</sup>. 'Bitter food can cure diabetes' was the commonest misconception in our study. Same was the finding of Rajkumar *et al.* where they found 46.6% of their study population believed so and 46.6% also believed that "herbal medication completely cures diabetes". Bitter taste is considered to neutralize sweet taste as both are opposing each other<sup>(8)</sup>. We did not include nondiabetics in our study and doing a community based study to compare the misconceptions prevalent in both these groups has to be considered. 'Diabetes is due to past sins' was the least common misconception among our population. Kerala being a state with high literacy this is quite expected and this is in contrast to studies from North India and Pakistan which project spiritual misbeliefs to be a major misconception<sup>(9)</sup>. In a hospital based study at Hyderabad, 60% of diabetic patients were of the opinion that they can stop treatment once blood sugar comes to normal<sup>(10)</sup>. This is the most important misconception affecting treatment compliance and proper education about the aetiology of diabetes is needed to tackle it.

In our study the level of misconceptions were found to be significantly more for rural population. In a study by Naila *et al* in Pakistan no difference in misconception level was found between city and village area though occupation, education and marital status were found to influence. 83% of the study population believed that diabetic individuals should not use sugar at any cost<sup>(11)</sup>.

A study at Eastern Saudi Arabia found that most people hold misconceptions regarding aetiology of diabetes than treatment or diet related. Misconceptions were found to be higher in illiterates, people with low income, retired and self-labour groups. In our study also educational status and occupation did affect the level of misconceptions and as our study population had an overall higher educational and occupational status the level of misconception was low<sup>(12)</sup>. A recent study done in Kerala to find the awareness about diabetes found that there are people who are not even aware of what DM is, some do not know that all ages can be affected by diabetes. The study also identified the common causes of diabetes as believed by people to be diet and hereditary. Only few were aware of the role of obesity and inactivity in leading to diabetes. Even among the diabetic patients there were individuals who did not know that long term treatment was required for diabetic management<sup>(13)</sup>.

Knowledge and beliefs regarding diabetes was assessed in 151 type 2 diabetic patients in New York. There was significant association between ignorance about disease and use of insulin, elevated HbA1c level, and female gender. There was no gender difference in level of misconceptions in our study<sup>(14)</sup>. Apart from

giving health education to curb the false beliefs, patient empowerment to train and help the patient to take decisions in their treatment, to check their disease status themselves and hence making them their own caretakers are important when long term follow-up is considered<sup>(15)</sup>. It is important to create a feeling of self-efficacy in patients so that self-care activities like blood sugar testing, exercise, diet modification are followed in the long run and the barriers that stand in the way must be dealt with adequately<sup>(16)</sup>.

## Conclusion and Recommendations

Most common misconception in our study was that "bitter food can cure diabetes" (76%) followed by "oral hypoglycaemics contain insulin". The overall low level of misconception in the study population may be because of high educational status and good occupation. This emphasizes the role of knowledge in overcoming misconceptions so that apt treatment is sought at apt time. There was no significant gender difference for the level of misconceptions and age also did not affect misconception status. The rural area was characterized by significant presence of misconceptions and proper guidelines for awareness creation among them can help in bridging the gap between disease and treatment. As part of our small scale intervention to spread awareness about diabetes, we have distributed pamphlets regarding diabetes among all our study participants.

## Limitations

This was a hospital based study taking diabetic patients only. A complete assessment about misconceptions can be made only if a community based study including non-diabetics also is done.

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## ✦ ORIGINAL ARTICLE

# Assessment of educational environment during MBBS course using modified DREEM questionnaire

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## Abstract

**Objectives:** The objectives were to measure the educational environment using the DREEM questionnaire and to measure the differences in perception of various batches of medical students. **Methodology:** Study participants were MBBS students from Pushpagiri Medical College, Tiruvalla. They were given the Dundee Ready Educational Environment Measure (DREEM) questionnaire and five additional questions. A total of 355 students took part in the study. The reliability of the DREEM questionnaire and the additional questions were measured using Cronbach's alpha coefficient. DREEM sub-categories were analyzed using ANOVA followed by post hoc test by Bonferroni method. Significance of age and sex were analyzed by independent t test. **Results:** Overall DREEM score was positive (117.07). Significant increase seen in DREEM scores and sub-categories in first year students. There was no significant differences between male and female students. Students under 21 years of age had significantly higher score for all DREEM sub-categories. **Conclusion:** There is decline in DREEM score after first year MBBS suggesting gradual loss of interest towards learning among the students. However, since it is a cross sectional study, there are limitations. Further cohort studies need to be done to study changes in student attitudes towards teaching learning process.

**Key Words:** Educational environment, medical students, DREEM, ANOVA, post hoc analysis.

## Introduction

A proper educational environment is necessary to ensure quality teaching (Bakhshialiabad et al, 2015). Educational environment is measurable, changeable, and enhances academic quality. Dundee Ready Educational Environment Measure (DREEM) is considered a valid and reliable tool, used globally for measuring medical educational environment (Soemantri et al, 2010). The learning environment is one of the targets for the evaluation of medical education programs (Genn, 2001; Roff & McAleer, 2001). There is a lot of recent interest in this field (Veerapen & McAleer, 2010; Lizzio et al, 2002).

Ideally, medical education environment should foster intellectual activities and progress, and at the same time encourage friendliness, co-operation and support.

As per a study, students in Year 1 were most disappointed by the "lack of support from faculty and their lack of interest in teaching," whereas, in Year 6, students were most concerned about an approach to teaching that equipped

them in theoretical knowledge at the expense of practical skills (Gąsiorowski&Rudowicz, 2014). Another study found that certain attitudes of medical students change with time. Scenarios like forging signatures, resubmitting work already completed for another part of the course, and falsifying patient information were regarded as wrong during 1<sup>st</sup> year but not so in later years (Rennie & Rudland, 2003).

One study report substantial changes in medical students' attitude towards ethics (negative trend) towards the later stages of course (Price et al, 1998). Cynical attitudes are increased and humanitarian attitudes are decreased as a result of medical education (Wolf et al, 1989). Another study suggests that students' view should be considered while teaching. There are also small gender-based differences in students' views (Samaga & Hemalatha, 2014). A study from Pakistan concludes that students are happy with teaching learning process (Khursheed & Baig, 2014).



This study was undertaken to assess the educational environment using a modified DREEM questionnaire.

## Methodology

**Study population:** Bachelor of Medicine and Bachelor of Surgery (MBBS) students from Pushpagiri Medical College (PIMS & RC), Tiruvalla.

**Study period:** July – August 2015 (2 months)

**Study design:** Cross sectional study

**Sample size:** All MBBS students from all current batches who were willing to take part in the study were included. Total number of students for all years together - 355. First - fourth year MBBS students who were willing to participate were included. Students who were not willing to take part were excluded.

## Study tools and protocol:

Written questionnaire was distributed to all students. The well-established “DREEM” questionnaire (Roff et al, 1997) as well as another set of questions meant to identify student's appreciation about teaching-learning process (self-developed and validated) was used for the study.

DREEM is a 50 item inventory, consisting of 5 subscales.

- (a) Students' Perceptions of Learning (SPoL) -12 items; maximum score - 48;
- (b) Students' Perceptions of Teachers (SPoT) -11 items; maximum score - 44;
- © Students' Academic Self-Perceptions (SASP) - 8 items; maximum score - 32;
- (d) Students' Perceptions of Atmosphere (SPoA) - 12 items; maximum score - 48;
- (e) Students' Social Self-Perceptions (SSSP) -7 items; maximum score - 28.

DREEM contains 50 statements relating to a range of topics directly relevant to education climate. Items were scored as follows: 4 for Strongly Agree (SA), 3 for Agree (A), 2 for Uncertain (U) and 1 for Disagree (D) and 0 for Strongly Disagree (SD). However, 9 of the 50 items (number 4, 8, 9, 17, 25, 35, 39, 48 and 50) are negatively phrased statements and scored 0 for SA, 1 for A, 2 for U, 3 for D and 4 for SD. The 50-item DREEM has a maximum score of 200, indicating the ideal educational environment.

The items with an average value of 3.50 are considered to be “*educational aspects of excellence*”; those between 3.01 and 3.49 are considered to be “*positive educational aspects*”; those with average values between 2.01 and 3.00 are considered to be “*educational aspects that could be improved*”; those 2.00 are defined as “*educational problematic areas*”. Items with score less than 2.0 should be analyzed carefully. For analyzing overall score, the following guidelines are followed: 0-50 – Very Poor, 51-100 – Plenty of problems, 101-150 – More positive than negative, 151-200 – Excellent (McAleer&Roff, 2001).

Written, informed consent was obtained from all students who took part in the study. Institutional ethical clearance was obtained from the Institutional Ethical Committee for the study.

Data were entered on Microsoft Office Excel 2015 and analyzed using SPSS 17.0, a software package developed by IBM Inc., USA. The reliability of the DREEM questionnaire and the additional questions were measured using Cronbach's alpha coefficient. DREEM sub-categories were analyzed for significance using ANOVA. Significance of DREEM score across the different batches was further analyzed using post hoc test by Bonferroni method. Significance of age and sex were analyzed by independent t test. P values less than 0.005 were taken as significant.

## Observation and results

Reliability statistics of DREEM questionnaire as measured by Cronbach's Alpha was 0.889 and the five additional questions was 0.637. Together the value was 0.891 suggesting high reliability.

The results are presented in Tables 1-5. The mean score was 117.07 which indicated a positive learning environment; however could be improved (Table 1). Most questions had positive mean score. Negative mean scores were obtained for questions 5 (“learning strategies that worked before continue to work now”), Q 27 (“I am able to memorize all I need”), Q 42 (“enjoyment outweighs stress of the course”), Q 49 (“I feel able to ask the questions I want”), Q 3 (“there is good support for students who get stressed”), Q 14 (“I am rarely bored”), and Q 46 (“accommodation is pleasant”). First MBBS students had highest scores in all the 5 sub-categories (Please see Table 2).

Female students had higher scores for sub-categories SPoL, SPoT, SASP and SPoA as well as total score, while lower scores for sub-category SSSP compared to male students. But this was not found to be statistically significant (Table 4). Students who were less than 21 years of age had higher scores for all DREEM sub-categories compared to those who were over 21 years. This was statistically significant (Table 5).

Table 1 - DREEM Sub-categories

	First Year (n=96)		Second Year (n=94)		Third Year (n=85)		Fourth Year (n=85)		Significance*
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
SpOL	31.625	5.881729	27.71277	6.578921	26.63529	5.764933	26.625	6.446224	<0.001
SpOT	29.5	5.749142	26.46809	5.80082	25.15294	5.053301	27.375	4.881831	<0.001
SASP	20.60417	6.151558	19.34043	5.371276	17.92941	4.710142	17.8625	5.359822	0.002
SpOA	29.82292	6.590256	25.71277	8.177628	24.97647	7.721301	26.7125	6.656478	<0.001
SSSP	17.27083	4.524737	13.28723	5.091892	15.52941	4.187817	14.775	4.714575	<0.001
All	128.8229	21.3364	112.5213	23.08038	109.2235	19.17363	113.35	21.84184	<0.001

\* Significance measured using ANOVA

Table 2 - Individual questions on DREEM

	First Year (n=96)		Second Year (n=94)		Third Year (n=85)		Fourth Year (n=85)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
I am encouraged to participate during teaching sessions	2.9	0.9	2.6	0.9	2.4	0.9	2.3	0.9
The teaching is often stimulating	2.8	0.8	2.4	0.9	2.1	1.0	2.3	1.0
The teaching is student-centred	2.6	0.9	2.4	1.0	2.0	0.9	2.0	0.9
The teaching helps to develop my competence	2.5	0.8	2.2	1.0	2.1	0.9	2.2	1.0
The teaching is well-focused	2.6	0.8	2.5	0.8	2.1	1.0	2.2	1.0
The teaching helps to develop my confidence	2.6	0.9	2.1	1.0	2.0	1.0	2.1	1.0
The teaching time is put to good use	2.8	1.0	2.4	1.0	2.1	1.1	2.0	0.9
The teaching over-emphasizes factual learning*	2.5	0.9	1.9	1.1	1.9	0.8	2.2	0.9
I'm clear about the learning objectives of the course	2.8	1.0	2.6	0.9	2.3	0.9	2.5	1.0
The teaching encourages me to be an active learner	2.5	1.0	2.4	1.0	2.1	1.0	2.1	1.0
Long-term learning is emphasized over short-term learning	2.5	1.0	2.3	0.8	2.4	0.9	2.6	1.0
The teaching is too teacher-centred*	2.6	1.1	2.0	1.1	2.0	0.9	2.3	1.0
The teachers are knowledgeable	3.3	0.8	3.2	0.7	3.3	1.2	3.5	0.6
The teachers adopt a patient-centred approach to consulting	2.5	0.9	2.6	0.9	2.3	0.9	2.6	0.9
The teachers ridicule the students*	2.5	1.2	1.9	1.1	2.1	1.0	2.2	1.0
The teachers are authoritarian*	2.6	1.0	1.6	1.1	2.0	0.9	2.0	1.0
The teachers have good communication skills with patients	2.6	0.8	3.0	0.8	2.8	0.8	3.0	0.8
The teachers are good at providing feedback to students	2.8	0.9	2.4	1.0	2.0	1.0	2.2	0.9
The teachers provide constructive criticism here	2.5	0.8	2.4	1.2	2.0	1.0	2.3	0.8
The teachers give clear examples	2.8	0.8	2.6	0.9	2.3	1.0	2.5	1.0
The teachers get angry in teaching*	2.5	1.1	1.7	1.2	1.8	1.1	2.2	1.1
The teachers are well-prepared for their teaching sessions	3.0	1.0	2.8	0.9	2.5	0.9	2.8	0.8
The students irritate the teachers*	2.4	1.2	2.0	1.1	1.9	0.9	2.0	1.2
Learning strategies that worked for me before continue to work for me now	2.0	1.2	2.1	1.0	1.9	1.1	1.9	1.2
I am confident about my passing this year	3.2	0.9	2.9	0.9	2.8	0.9	2.7	1.2
I feel I am being well prepared for my profession	2.7	1.0	2.3	1.0	2.1	0.9	2.2	1.0
Last year's work has been a good preparation for this year's work	2.4	1.0	2.5	1.0	2.1	1.1	1.9	0.9
I am able to memorize all I need	1.7	1.1	1.6	0.9	1.5	0.9	1.2	1.0
I have learnt a lot about empathy in my profession	2.8	1.0	2.8	1.0	2.7	1.1	2.8	1.0
My problem-solving skills are being well developed here	2.6	0.9	2.6	2.3	2.8	1.1	2.4	1.1
Much of what I have to learn seems relevant to a career in healthcare	2.9	0.7	3.0	0.7	2.9	0.9	2.8	0.9
The atmosphere is relaxed during ward teaching	2.4	0.9	2.3	1.0	1.9	1.1	1.9	1.1
This school is well time-tabled	2.6	1.0	2.6	1.0	2.2	1.2	2.6	0.9
Cheating is a problem in this school*	2.5	1.3	2.2	1.2	1.9	1.0	2.4	1.2
The atmosphere is relaxed during lectures	2.6	1.0	2.2	1.0	2.3	1.1	2.5	1.1
There are opportunities for me to develop my interpersonal skills	2.6	1.1	2.3	1.1	2.2	1.2	2.5	1.1
I feel comfortable in class socially	2.8	0.9	2.4	1.1	2.7	0.9	2.7	0.9
The atmosphere is relaxed during class/seminars/tutorials	2.6	0.9	2.3	1.0	2.3	1.1	2.5	1.0
I find the experience disappointing*	2.6	1.1	2.3	1.2	2.4	0.9	2.4	1.1
I am able to concentrate well	2.2	1.0	2.1	1.0	1.8	0.9	1.8	1.0
The enjoyment outweighs the stress of the course	2.0	1.1	1.8	1.3	1.7	1.0	1.6	1.2
The atmosphere motivates me as a learner	2.5	0.9	2.0	1.0	2.0	1.0	2.9	1.1
I feel able to ask the questions I want	2.1	1.0	1.9	1.0	1.8	1.1	1.9	1.2
There is a good support system for students who get stressed	2.3	1.1	1.3	1.2	1.2	0.9	1.2	1.0
I am too tired to enjoy the course*	2.5	1.1	2.0	1.2	2.2	1.0	2.4	1.2
I am rarely bored in this course	1.9	1.3	1.6	1.1	2.0	1.0	1.7	1.1
I have good friends in this course	3.1	0.9	2.9	1.0	3.1	1.0	2.8	1.2
My social life is good	2.6	1.0	2.8	1.2	3.0	0.9	2.7	1.1
I seldom feel lonely	2.2	1.1	2.0	1.3	2.3	1.2	2.2	1.3
My accommodation is pleasant	2.6	1.2	1.6	1.3	2.1	1.3	1.8	1.5

Table 3 - Additional Questions

	First Year (n=96)		Second Year (n=94)		Third Year (n=85)		Fourth Year (n=85)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Compared to when you joined MBBS, you are feeling as enthusiastic (or more) about the profession	2.4	1.1	2.8	1.2	2.4	1.1	2.4	1.1
Do you feel that the process of evaluation (exams) is appropriate	2.3	0.9	2.4	1.1	2.0	1.1	2.5	1.0
Do you think the emotions of patients are to be respected	3.2	0.9	3.5	0.8	3.3	1.0	3.2	1.0
If you are caught manipulating patient history/examination findings, you will accept blame	2.8	0.9	2.9	1.0	2.9	1.0	3.0	0.8
In the event of wrong doing, would you accept punishment happily	2.8	0.9	2.8	0.9	2.6	1.1	2.5	1.0
All 5 questions*	13.5	3.5	14.4	2.9	13.3	3.4	13.6	3.2

Table 4 - Sex distribution and DREEM scores

	Females (n=265)		Males (n=89)		Significance
	Mean	SD	Mean	SD	
SPoL	28.4038	6.57008	26.9101	6.51683	0.064
SPoT	27.2453	5.58239	26.9888	5.82021	0.711
SASP	19.2453	5.61419	18.3708	5.30090	0.198
SPoA	27.1698	7.66173	26.1236	7.08042	0.257
SSSP	14.9547	4.088018	16.0112	4.73021	0.076
DREEM (Total)	117.0189	22.84242	114.4045	22.44980	0.349
Total Additional 5 questions	13.8812	3.15699	13.2386	3.50367	0.109

Table 5 - Age and DREEM scores

	Age <21yrs (n=143)		Age >21yrs (n=210)		Significance
	Mean	SD	Mean	SD	
SPoL	30.3566	6.31163	26.4524	6.31093	0.064
SPoT	28.4406	5.78076	26.2952	5.37658	0.711
SASP	20.1538	5.85663	18.2762	5.20305	0.198
SPoA	28.6573	7.28408	25.6952	7.47708	0.257
SSSP	16.1189	4.84621	14.6190	4.79210	0.076
DREEM (Total)	123.7273	22.76184	111.3381	21.42361	0.349
Total Additional 5 questions	13.7535	3.09469	13.7282	3.34283	0.943

## Discussion

A study from India on 914 students found a mean DREEM score of 120.21. Male students and post-graduate students had more positive scores (Sunkad et al, 2015). Another study found that assessment of academic environment quality is inversely related to time spent during undergraduate years (Ortega et al, 2015). A study evaluated Spanish medical students from 5 medical schools in 2<sup>nd</sup> and 4<sup>th</sup> years of training. The average score was significantly more in 2<sup>nd</sup> year (~116) compared to 4<sup>th</sup> year (~105) (Palés et al, 2015).

A huge study on 9096 Korean students for their perception of learning environment by DREEM questionnaire found that their overall perception is positive (Mean score 113.97) (Park et al, 2015). In a study on 117 undergraduate students in Kuwait medical colleges, the mean score was 108.7 (Karim et al, 2015).



Another study found that female students were more satisfied with learning environment (Rahman et al, 2015). An Iranian study on 493 medical students also report overall positive perceptions of the learning environment (Mean score 113.5) (Bakhshialiabad et al, 2010).

A study from 2084 students in medical colleges from Pakistan report a mean score of 105 (Imran et al, 2015). A total of 272 Nigerian medical students were studied and it was found that their mean score was 108.4, which was unaffected by age, sex, and year of study (Buhari et al, 2014). A group of 438 Malaysian medical students were studied and found to have positive DREEM score (Al-Naggar et al, 2014).

An Indian study from Manipal University found a mean DREEM score of 123. First year students had highest scores (Pai et al, 2014). A mean DREEM score of 112 was found among 454 medical students in a new medical college in Saudi Arabia (Al-Mohaimeed, 2013). Yet another Indian study on final year medical students and interns of JSS Medical College, Mysore found that the mean score is positive (Kiran & Gowdappa, 2013). A recent Indian study from Western Maharashtra found an overall score of 136, with higher scores for second years and female students (Bhosale, 2015).

A study on 73 undergraduate medical students in Netherlands found score of 131.79 (Shankar et al, 2013). Another Indian study on 348 medical students in UCMS & GTB Hospital, New Delhi, found to be negative for 8<sup>th</sup> semester students (89.8) whereas 2<sup>nd</sup> semester students was positive, but sub-optimal (101.3) (Kohli & Dhaliwal, 2013). A study on 278 undergraduate and 43 post-graduate students in Kolkata found that undergraduate students are happy with the learning environment (Naser et al 2012). A study on 278 undergraduate students from West Indies found a sub-optimal mean score of 102.8 (Pierre et al, 2010). A study was conducted on 403 medical students in a new medical college in UK and found a mean DREEM score of 141 (Miles & Leinster, 2009). In a study from MMMC, Manipal University, India, first years had better score (Abraham et al, 2008). In a study on 339 medical students in Sri Lanka, an overall DREEM score of 108 was found. There was no statistical difference between the different phases of study (Jiffry et al, 2005).

## Conclusions

Overall DREEM score was positive (117.07), but there is need for improvement. Most of the individual questions also gave positive score. There is a decline in score from first year onwards, with minimum score for third year. The results of post hoc analysis show that there was significant difference in DREEM score between first years and all the other years. Similar results are also obtained for sub-categories of DREEM. Analysis of the additional questions used showed that there is a decline in enthusiasm of students from first year onwards, with lowest scores for third years. Since this is a cross-sectional study, there are several limitations. Further cohort studies need to be conducted to gain better understanding of the process.

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## Declaration of interests

The authors report no declaration of interest.

## Abbreviations

DREEM- Dundee Ready Educational Environment Measure

MBBS - Bachelor of Medicine and Bachelor of Surgery

SPoL - Students' Perceptions of Learning

SPoT - Students' Perceptions of Teachers

SASP - Students' Academic Self-Perceptions

SPoA - Students' Perceptions of Atmosphere

SSSP - Students' Social Self-Perceptions

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## ✦ ORIGINAL ARTICLE

# Ultrasound diagnosis of Carpal Tunnel syndrome-A study of 30 patients

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## Abstract

**Introduction-** The aim of our study was to evaluate the ability of ultrasound to diagnose carpal tunnel syndrome(CTS) in comparison to nerve conduction studies(NCS). **Materials and methods-** This prospective study included patients presenting to our institution with clinical symptoms suggestive of carpal tunnel syndrome. They underwent nerve conduction studies and ultrasound evaluation of the median nerve at the wrist joint. They were evaluated for three parameters-area of the median nerve at wrist, flattening ratio and flexor retinaculum bowing.

**Results-** Out of the 30 patients with carpal tunnel syndrome by NCS, 26 had increased median nerve area by ultrasonography. This finding proved to be the single best criteria for diagnosis of CTS with a sensitivity of 86.67% and specificity of 87.5%. Twenty one of thirty patients had increased bowing of flexor retinaculum and this finding showed a sensitivity of 70% and specificity of 75%. Flattening ratio only had a sensitivity of 50% and specificity of 62.5%. Using a combination of criteria, the best sensitivity (70%) and specificity (100%) was obtained for the combination of median nerve area and flexor retinaculum bowing.

**Conclusion-** This study confirms that USG is a reliable alternative to NCS in the diagnosis of CTS.

**Key Words:** Carpal tunnel syndrome, ultrasonography

## Introduction

Carpal tunnel syndrome(CTS) is the most common peripheral nerve entrapment syndrome and has been conventionally diagnosed by clinical evaluation and nerve conduction study(NCS)<sup>(1)</sup>. But NCS is relatively time consuming, expensive and uncomfortable to the patient. Reports over the past few years have suggested that ultrasound(USG) can be used as a cheap, easily available, fast and reliable alternative to NCS for the diagnosis of CTS<sup>(2-4)</sup>. The aim of our study was to evaluate the role of USG in the diagnosis of CTS in the Indian population.

## Materials and methods

The study was conducted over a six month period from January to June 2010, in the department of neurology and radio diagnosis in a tertiary care institution. The required sample size was calculated based on the sensitivity of previous studies. The patients presenting to Neurology department with complaints suggestive of carpal tunnel syndrome was included

in the study. Clinically, carpal tunnel syndrome was suspected if the following features were present

Paraesthesia of the hands with two other features like

- 1.Nocturnal paraesthesia awakening patient from sleep.
- 2.Pain and or paraesthesia precipitated by holding objects.
- 3.Pain and or paraesthesia aggravated by elevating upper limb above shoulder and relieved by hanging it down or wringing the hands

Patients with prior history of surgery of the carpal tunnel, anatomical abnormalities of median nerve at wrist eg: bifid median nerve and patients not willing to take part in the study were excluded from participating in the study

Nerve conduction study of the median nerve was considered to be the gold standard in the study.

All patients were initially assessed clinically by the neurologist and patients with symptoms of carpal tunnel syndrome underwent nerve



conduction study in the neurology department. These patients were then subjected to a detailed ultrasonographic examination following a preset proforma.

The ultrasonographic examination was done by the investigator in the radiology department using 5-17MHz linear array transducer (iU22, Philips, Best, the Netherlands)

The investigator was blinded to the clinical history including the symptoms at presentation, the physical findings at examination, the side of involvement and electrodiagnostic study findings.

### Criteria for ultrasonographic diagnosis

Most of the previous studies focused mainly on three ultrasonographic criteria<sup>(5-7)</sup> which were also evaluated in our study--Increased median nerve area greater than  $10\text{mm}^2$ , increased flattening ratio greater than 3 and increased flexor retinaculum bowing greater than 4mm.

### Ultrasonographic technique

Subjects were seated facing the examiner. The arms were extended; wrists were rested on a flat surface, forearms were supinated and partially flexed, and the fingers were semi extended. Images were obtained in a plane perpendicular to the long axis of the median nerve near the wrist crease at the level of the proximal carpal tunnel. The area measurement of the nerve was obtained by direct tracing with electronic calipers around the margin of the nerve on sonograms.

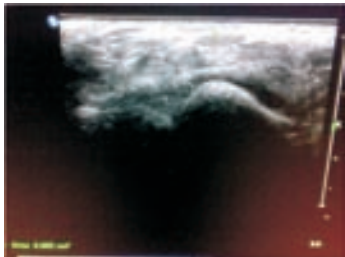


Fig.1- Ultrasound image showing normal median nerve area at wrist

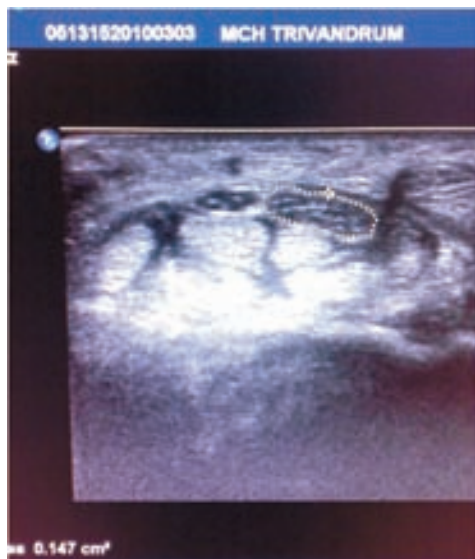


Fig. 2- Ultrasound image showing increased median nerve area at wrist

The flexor retinaculum is seen as an echogenic band spanning the carpus. Bowing of the flexor retinaculum was determined by drawing a straight line between its attachments to the tubercle of the trapezium bone and the hook of the hamate bone and measuring the distance from this line to the palmar apex of the ligament. (Fig.1, 2, 3 & 4)

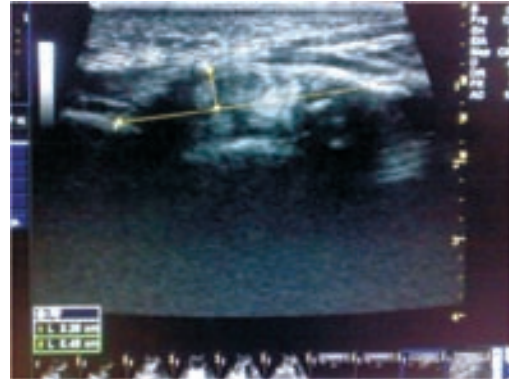


Fig. 3- Increased flexor retinaculum bowing greater than 4mm

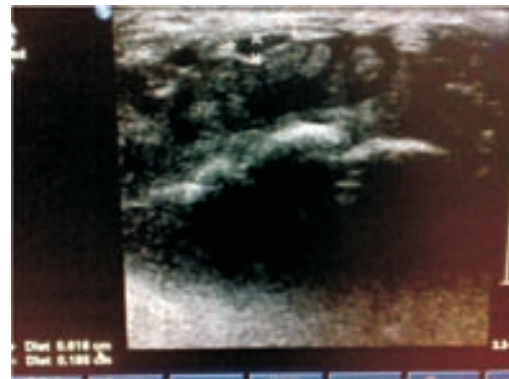


Fig. 4 - Increased flattening ratio greater than 3

At each level, the mediolateral and antero-posterior diameters of the median nerve were measured. Flattening ratio of the median nerve was calculated as the ratio of the nerve's mediolateral to anteroposterior diameter.

### Statistical analysis

All statistical analysis was done with the help of statistical software (SPSS 18.0)

Statistical analysis in this study was done and sensitivity, specificity and associated statistics were worked out and provided. An attempt was made to evaluate various combinations of sonological features to obtain a highly sensitive and highly specific test. ROC curves were drawn for relevant criteria.

### Results

A total of 38 patients were evaluated in the six month period. Out of the 38 patients with hand symptoms, 30 had carpal tunnel syndrome based on the gold standard, nerve conduction study.

Each USG examination took around 10 minutes. The median nerve area and the flattening ratio



were found to be the easiest technically while the determination of the bowing of the flexor retinaculum was relatively more difficult to perform.

Among the cases of carpal tunnel syndrome the highest peak was noted between 40-49 years (39.47%) and the second highest peak was noted between 30-39 years (15.79%) confirming previous literature which suggests that carpal tunnel syndrome is a disease of the middle age<sup>(8)</sup>.

Among the patients who were positive for CTS on NCS almost 67% were female. This compares well with previous literature which describes CTS as a disease of the middle aged female<sup>(9)</sup>.

Out of the 30 patients with carpal tunnel syndrome by NCS, 26 had increased median nerve area by ultrasonography and out of the 8 patients with no CTS by NCS only one had increased nerve area. The increase in median nerve area proved to be the best single criteria for diagnosis of CTS with a sensitivity of .86.67% and specificity of 87.5%. It had a positive predictive value of 96.3% and negative predictive value of 63.64%. ROC curve was drawn for this data and the best cut off was found to be 9.5mm<sup>2</sup>, which had the same specificity and sensitivity as cut off adopted during the same study i.e. 10mm<sup>2</sup>.

The next best single criteria was found to be the bowing of the flexor retinaculum. Out of the 30 patients with CTS by NCS 21 had increased flexor retinaculum bowing and out of the 8 patients with no CTS by NCS only 2 had increased flexor retinaculum bowing. It had a sensitivity of 70%, specificity of 75%, positive predictive value of 91% and negative predictive value of 40%.

The flattening ratio of the median nerve turned out to be a poor criteria for diagnosis of CTS based on our data with a sensitivity of 50%, specificity of 62.5%, positive predictive value of 85.71% and negative predictive value of 25%.

A test criterion of presence of two specific sonographic features was evaluated in the present study. The combination of median nerve area and flexor retinaculum bowing was found to have the best sensitivity (70% and specificity (100%). Both the other combinations had a sensitivity less than 50% which render them unusable.

## Discussion

In the past clinical evaluation and NCS has been the mainstay of diagnosis of CTS. Recent reports suggest that USG can be used as a cheap and easily available alternative. The aim of our study was to evaluate the role of USG in the diagnosis of CTS in the Indian population.

The previous investigators like Bushberger et al, Wong et al, Sarria et al and Duncan et al had used three main criteria for the sonographic diagnosis of carpal tunnel syndrome. These three criteria increase in the median nerve area above 10mm<sup>2</sup>, flexor retinaculum bowing greater than 4mm and flattening ratio greater than 3- were evaluated in our study also.

In 1992 Buchberger et al proved that swelling of the median nerve resulting in increased area on USG is a reliable parameter to detect carpal tunnel syndrome<sup>(10)</sup>. In 1999 Duncan et al showed that increased area of median nerve greater than 9 mm<sup>2</sup> had a sensitivity of 82.4% and specificity of 97.1%. In 2004 Wong et al obtained a sensitivity of 94% and specificity of 65% for the same finding<sup>(4)</sup>.

The sensitivity and specificity of increased area of median nerve as a test criterion for the diagnosis of carpal tunnel syndrome in the present study were 86.77% and 87.5%.

These values are comparable to previous literature on the subject. Different authors have differed in the best cut off to be used to define the increased area of median nerve. Previous authors used a cut off of 9 mm<sup>2</sup> while later authors preferred a cut off 10 mm<sup>2</sup> since it gave better specificity. Values as low as 8.8 mm<sup>2</sup> and as high as 15 mm<sup>2</sup> have been used with associated better sensitivity and specificity respectively.

The increased bowing of the flexor retinaculum has been shown by many authors like Buchberger et al, Duncan et al and Sarria et al<sup>(11, 12)</sup> to be a parameter to be considered in the ultrasonological diagnosis of carpal tunnel syndrome. Sarria et al showed that an increased flexor retinaculum bowing of greater than 2.5mm has a sensitivity of 81.3% and specificity of 64.3%. In the present study the cut off for increased flexor retinaculum bowing was taken as 4 mm following Buchberger et al<sup>(10)</sup>.

In the present study increased flexor retinaculum bowing had a sensitivity of 70% and specificity of 75%. Compared to the study by Sarria the decrease in sensitivity and increase in specificity is expected since the cut off is higher. Another source of difference could be the relatively difficult technique required to measure the flexor retinaculum bowing. The chances of error during measurement of flexor retinaculum bowing are much higher than that during measurement of area of median nerve or flattening ratio of median nerve.

The earlier investigators used flattening ratio of the median nerve measured at the wrist as a criteria for diagnosis of carpal tunnel syndrome. Buchberger et al advocated the use of this criterion for diagnosis of carpal tunnel syndrome. But later investigations did not substantiate this. In 1999 Duncan et al showed that a flattening ratio of >3.3 had a sensitivity of 38.2% and specificity of 75%. In the present study increased flattening ratio showed a sensitivity of 50% and specificity of 62.5%. The present study also shows that flattening ratio is not an adequate criterion for the diagnosis of CTS.

Using a combination of criteria, the best sensitivity and specificity was obtained for the combination of median nerve area and flexor retinaculum bowing. Both the other combinations had a sensitivity less than 50% which render them useless.

Our study was limited by the small number of cases evaluated. Larger studies are suggested in future.

## Conclusion

Our study confirmed that USG is a reliable, cheap and easily available alternative to NCS in the diagnosis of CTS. Western literature suggests that increased median nerve area and increased flexor retinaculum bowing are reliable criteria for diagnosis of CTS. We were able to prove similar results in the Indian population based on our study.

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## ✦ ORIGINAL ARTICLE

# Hand Washing: Knowledge, Attitude and Practices among House Surgeons in a Tertiary Care Centre in South Kerala

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## Abstract

**Background:** Hospital acquired infections are gaining attention, rates varying from 3 to 21% globally, based on the fact that transmission occurs through the hands of health care workers. Hand hygiene is one of the best measures for infection control. **Objective:** To study the knowledge, attitude and practices related to hand washing among house surgeons of a tertiary care centre in South Kerala. **Methodology:** A cross sectional study was conducted among 102 house surgeons available at the time of study, in a tertiary care institution in Kerala. To meet the objective, a self-administered, pre-tested structured questionnaire and WHO hand hygiene questionnaire were applied. The data was entered in MS Excel spreadsheet 2010 and analysed using statistical package. Descriptive statistics and Fischer's test of significance were done as appropriate, and  $p < 0.05$  was considered as significant. **Results:** Almost all the participants had good knowledge about hand washing, 76.5% had good practices and 72.5% good attitude. The most neglected hand hygiene situation was washing the hands before touching the patient (31.2%). Only 19 out of 102 (18.6%) were fully aware of correct techniques in hand washing. **Conclusion:** Almost all house surgeons had adequate knowledge, and majority had good attitude and good practices. But less than one-fifth knew the correct steps by the WHO hand washing protocols and there was default in adherence. The importance needs to be reinforced.

**Key words:** Hand washing, Knowledge, Attitude, Practices, House surgeons

## Introduction

Hospital acquired infections have been gaining attention not only because of magnitude of problem in terms of mortality and morbidity but also due to the fact that most of them are preventable. The significance of hand washing in patient care was conceptualised in 19<sup>th</sup> century when decontamination was used to reduce the incidence of puerperal sepsis and staphylococcus infections in new-borns that was acquired through direct contact<sup>(1,2)</sup>. Later, in the second half of 20<sup>th</sup> century, several guidelines were issued regarding hand washing practices<sup>(3,4)</sup>. Slowly, use of alcohol based solutions superseded use of antimicrobial soaps in decontamination<sup>(5)</sup>.

With the increasing burden of hospital acquired infections, World Health Organisation (WHO) launched global patient safety challenge "Clean Care is Safer Care (CCiSC)"<sup>(6)</sup>, later modified in 2009 as "SAVE LIVES: Clean Your Hands"<sup>(7)</sup>.

Compliance with hand hygiene among health care providers has been reported to be as low as 40%<sup>(8)</sup>. An effective strategy was introduced by WHO to address this problem, ie. "My five moments for hand hygiene". These five moments included moment before touching a patient, before performing aseptic and clean procedures, after having risk of exposure to body fluids, after touching patient, and patient surroundings. The steps of hand washing as per the WHO guidelines is expected to be adhered to in health care practice<sup>(9)</sup>.

WHO reports that over 1.4 million people suffer from infections acquired in health care settings. Rates of nosocomial infections vary from 3 to 21% in various hospitals around the world. These infections are most commonly transmitted by the hands of health workers which highlight the need for proper hand hygiene to reduce the rate of nosocomial infections. The hands of health care workers (HCW) will be progressively colonized with pathogens during patient care<sup>(10)</sup>.

The longer the duration, the higher the rate of contamination which often leads to endemic health care associated infections.

The house surgeons form a major work force in teaching hospitals where they often serve as the - point person to deal with moment-to-moment issue<sup>(11)</sup>; hence the importance of their awareness and practice of hand hygiene. The present study assessed these along with their attitude towards hand hygiene to throw a light on corrective measures if necessary.

## Objective

To study the knowledge, attitude and practices of hand washing among house surgeons in a tertiary care centre in South Kerala.

## Materials and Methods:

This cross sectional study was conducted among house surgeons belonging to a tertiary care institution in Central Kerala. Out of 150 house surgeons who were approached, 102 gave consent to participate in the study. Ethical approval was obtained from our Institutional Ethics Committee.

A self-administered pre-tested structured questionnaire was used for data collection. It consisted of 22 questions, first six questions with "yes or no" response, and eighth question was to arrange the steps of hand hygiene in the correct order assessed as per the WHO hand hygiene questionnaire for health care workers. Attitude was assessed with ten questions where responses ranged from strongly agree to strongly disagree on a five point scale. A score of one was awarded for correct responses to knowledge, positive attitude and good practices, and zero for the other responses. A score of more than 50% was considered good and less than that poor.

The participants were approached individually and explained about the objectives of the study. After obtaining consent, the questionnaire was given to them and collected back duly filled. Those who were not present on the day of data collection were contacted and the questionnaire given to them when they were available. Maximum of two attempts were made to contact a missing person.

After collection of data, they were scrutinized and wrong entries corrected. Data was coded and entered onto MS Excel 2010 spreadsheet, cleaned and analysed using a statistical package. Descriptive statistics was used to analyse knowledge, attitude and practice. Total scores were calculated. Fischer's exact test was used for qualitative variables. P value <0.05 was considered as statistically significant.

## Results

Out of 150 house surgeons, 102 participated in this study. It was found that almost 50% were not aware whether regular use of hand creams led to colonization of bacteria on the skin. However all the individuals agreed that proper hand hygiene could prevent the transmission of germs after body fluid exposure (Table 1).

Table 1: Distribution of Participants by Knowledge Responses regarding Hand Hygiene

Statement	Correct (%)	incorrect (%)
Avoid due to likelihood of colonization of hands with harmful germs:		
a) Wearing jewellery	94.1	5.9
b) Wearing artificial nails	95.1	4.9
c) Regular use of hand cream	52.0	48.0
d) Damage to skin	92.2	7.8
Hand hygiene action preventing transmission of germs to patient:		
a) Before touching the patient	99	1
b) Immediately after body fluid exposure	91.2	8.8
c) After body fluid exposure to patient surroundings	85.3	14.7
d) Immediately before a clean/aseptic procedure	97.1	2.9
Hand hygiene action preventing transmission of germs to health worker:		
a) Before touching the patient	82.4	17.6
b) Immediately after body fluid exposure	100	-
c) After body fluid exposure to patient surroundings	91.2	8.8
d) Immediately before a clean/aseptic procedure	85.3	14.7
True about alcohol based hand rub and hand washing with soap and water:		
a) Hand rubbing is more rapid for hand cleansing than hand washing	85.3	14.7
b) Hand rubbing causes more skin rashes than hand washing	57.8	42.2
c) Hand rubbing is more effective against germs than hand washing	59.8	40.2
d) Hand washing and hand rubbing are recommended to be performed in sequence.	63.7	36.3
Most effective regimen when hands not soiled or visibly contaminated with blood:		
a) Washing with plain soap and water	31.4	68.6
b) Washing with antimicrobial soap and water	82.4	17.6
c) Applying 1.5-3 ml alcohol based hand rub to the hands and rubbing hands together until they feel dry	80.4	19.6
Hand hygiene method in the following situations (rubbing, washing, none)		
a) Before abdominal palpation	85.3	14.7
b) Before giving injection	97.1	2.9
c) After removing examination glove	68.6	31.4
d) After visible exposure to blood	91.2	8.8

In the study group 54.9% felt that newly qualified staff receive proper training regarding hand hygiene; 45.9% did not seek to wash hands after using gloves. (Table 2)



Table 2: Attitude of the Study Participants toward Hand Hygiene

Statement	Bad attitude (%)	Good attitude (%)
Adherence to correct hand hygiene practices all the time	15.7	84.3
Sufficiency of knowledge about hand hygiene	25.5	74.5
First priority to hand hygiene when compared to other tasks	2	69.6
Hand hygiene not considered more difficult in some situations	35.3	64.7
Wearing glove considered to reduce need for hand hygiene	45.1	54.9
frustration when others omit hand hygiene	30.4	64.7
No reluctance in asking others to follow hand hygiene	39.2	54.9
Training of new staff in hand hygiene	45.1	54.9
Guilty when omitting hand hygiene	35.3	64.7
Adherence to hand hygiene practices is easy	23.5	76.5

Table 3: Hand Hygiene Practices of the Study Participants

Statement	Bad attitude (%)	Good attitude (%)
Do not forget to practise hand hygiene	59.8	40.2
Hand hygiene is a part of my duty	29.	70.6
Frequency of hand hygiene not bothersome	80.4	19.6
Use reminder boards as prompters	67.6	32.4

Nearly half of the participants forgot to wash their hands, while majority found that frequency of hand washing was bothersome. But 70.6% of the participants did realise that hand hygiene is integral to their roles (Table 3). Almost all the house surgeons had good knowledge score; 76.5% of house surgeons had good practice score while 72.5% had good attitude score.

Table 4: Association between Practice and Attitude, Total Knowledge, and Knowledge of WHO Hand Hygiene Steps in the Study Participants

		Practice		Total	P value
		Good practice	Bad practice		
Attitude	Bad	11 (39.3%)	17 (60.7%)	28	0.035*
	Good	13 (17.6%)	61 (82.4%)	74	
Knowledge	Poor	-	1 (100%)	1	1.0
	Good	24 (23.8%)	77 (76.2%)	101	
Knowledge of WHO steps	Adequate	4 (21.1%)	15 (78.9%)	19	1.0
	Inadequate	20 (24.1%)	63 (75.9%)	83	
	Total	24 (23.5%)	78 (76.5%)	102	

Fischer's exact test \* Significant

It was found that most of the participants with good knowledge also had good practices but there was no association between knowledge of WHO hand

hygiene steps and practice of proper hygiene among house surgeons. (Table 4)

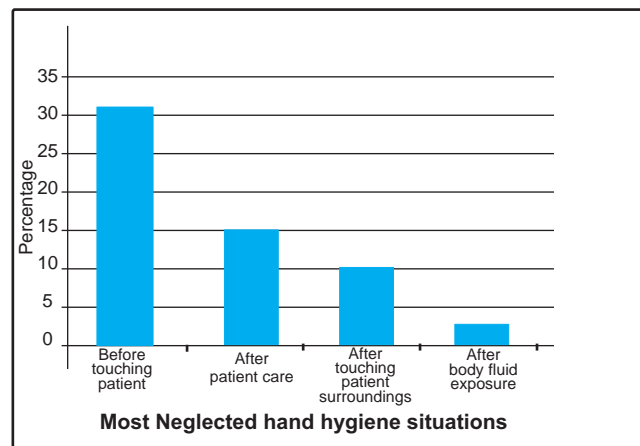


Figure 1: Most Neglected Moments of Hand Hygiene Practice in the Study Group

The most neglected hand hygiene situation was washing the hands before touching the patient (31.2%). None of the participants neglected practice of hand hygiene before clean/aseptic procedures.

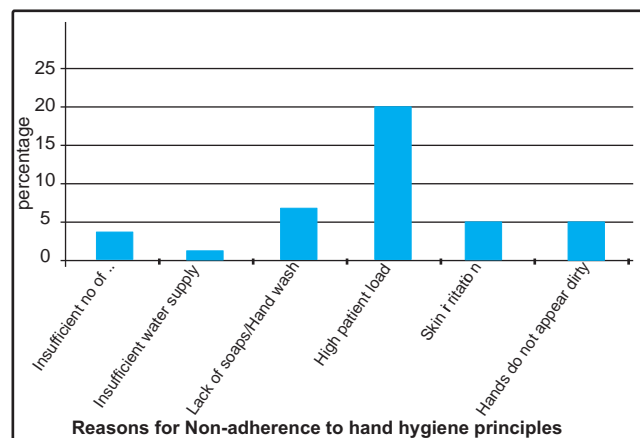


Figure 2: Reasons for Non Adherence to Hand Hygiene Principles in the Study Group

Increased patient load followed by lack of access to soap/hand wash were the reasons for not adhering to the hand hygiene principles whereas insufficient water supply contributing as the least.

## Discussion

In this study, 99% participants had good knowledge on hand hygiene. Nair et al in a similar study among medical and nursing students in Raichur observed that only 9% had good knowledge and 74% had moderate knowledge regarding hand hygiene with a higher cut off than in our study<sup>(12)</sup>. In another study done outside India among hospital residents, only 4.3 % had good knowledge on hand hygiene<sup>(13)</sup>. In our study, 18.6% had correct knowledge of steps in hand washing whereas in the study conducted in Raichur, 91.3% knew the correct technique of hand washing<sup>(12)</sup>. Moreover, 52.1% and 19.6% had good attitude and hand hygiene

practices compared to 72.5% and 76.5% respectively in our study. Two other studies done at Vijayawada and Tehran showed that two out of 100 house surgeons and 3.1%(13) medical residents knew correct steps in hand washing. About 45.1% thought gloves as a substitute for hand washing whereas only 22% thought the same in study conducted at Vijayawada<sup>(14)</sup>.

Hand sanitizers were thought to be better than soap and water by 41 (40.2%), in a study among house surgeons in Vijayawada, similar to our study with 43% having the same opinion. Whereas 68.6% were aware that they had to wash hands after removing gloves which was nearly 88% in the above mentioned study<sup>(14)</sup>.

In this study 67.2% practised hand washing before touching the patient and 90.2% practised after touching the patient which was 87% and 95% in the study conducted in Vijayawada. In a similar study on infection control knowledge only 13.6% of intern doctors washed their hands before and after seeing patients<sup>(15)</sup>.

According to Chavali *et al*, 91% washed their hands after seeing the patient and in another study that focused on self-reported practices of hand hygiene among trainees of teaching hospital, 4.7% disinfect before touching the patient and 20.9% after patient care<sup>(16,17)</sup>. The major obstacle for improper hand hygiene in our study was patient load, followed by lack of soap or hand wash supply. According to Muhammed Ali *et al*, non-availability of hand hygiene facilities, shortage of soap and water, disposable towels and gloves were the most frequently reported reasons for not adhering to hand hygiene principles<sup>(10)</sup>. The study has inherent limitations of a cross sectional study; it was limited to one centre and so not generalizable.

## Conclusion

In our study almost all the house surgeons had adequate knowledge, around three-fourth had good attitude and good practices. Less than a fifth of them knew correct steps by WHO hand washing protocols. The most neglected hand hygiene situation was washing hands before touching the patient. The major reasons for difficulty in practising proper hand hygiene were increased patient load and lack of soap and hand wash. There was significant association between good attitude and good hand hygiene practices.

## Recommendations

Sessions on hand hygiene must be incorporated into medical education, mandatory house surgeons orientation and repeated as reminder with particular emphasis on washing hands before touching the patient. Availability of soap solutions and disposable paper towels near designated washing areas may be ensured. Helpful posters may be kept nearby washing areas and nursing stations as reminders.

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## ✦ ORIGINAL ARTICLE

# eGFR does not correlate with glomerular histology in adult onset nephrotic syndrome- A Clinicopathological Study

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## Abstract

**Introduction:** Nephrotic syndrome is a kidney disorder caused by the derangement in the size selective and charge barrier of the glomerular capillary walls resulting in increased permeability to plasma proteins. Our study was undertaken with an attempt at analysing the structural functional relationship in adult onset nephrotic syndrome. **Methods:** The patients, aged 14 years or more, diagnosed with adult onset nephrotic syndrome were selected. The diagnosis were confirmed by light microscopy and immunofluorescence. The histological parameters studied included glomerular parameters. The eGFR was calculated using the MDRD formulae. **Results:** Only negligible correlation was noted between the glomerular parameters and eGFR. **Conclusion:** Our study shows that renal function calculated by eGFR does not correlate with the glomerular parameters. Studies aimed at understanding the exact pathophysiology would help in producing targeted therapy and thus an attempt can be made to halt progression of renal dysfunction.

**Key Words:** Adult onset nephrotic syndrome, Renal histology, eGFR

## Introduction

Nephrotic syndromes are diseases primarily affecting the glomerulus. Glomerular factors of chronicity include glomerular sclerosis, atrophy and periglomerular fibrosis and they are common features of end stage disease. The proteinuria also produces interstitial inflammation and eventually goes on to produce tubular atrophy and interstitial fibrosis. In few of these patients, the functional deterioration ensues ultimately resulting in renal failure. Although the glomeruli are the prime target of disease, many studies have shown that the level of renal function in these individuals correlate best with the interstitial and tubular parameters. Studies regarding the glomerular changes have shown contradictory results with majority of the studies showing no significant correlation to the degree of renal insufficiency while a few studies did. Hence, a question arises as to why the renal failure correlates better with the tubulo-interstitial parameters rather than the glomerular damage.

Thus various hypotheses have been suggested, but major studies in regard to a structural functional correlation have not been undertaken

Understanding the molecular mechanisms and factors leading to tubulo-interstitial damage would help signify the importance of the interstitium in the normal function of the kidney. This would facilitate better characterization of prognostic factors of the diseases and more targeted therapy in this regard can be undertaken.

Our study was hence carried out with an attempt at analysing the structural functional relationship in adult onset nephrotic syndrome in view of these conflicting results.

## Objectives

1. To calculate the eGFR in these patients.
2. To analyze the glomerular histological characteristics of the patients diagnosed as adult onset nephrotic syndrome.
3. To correlate the eGFR with the histological features.

## Methodology

The study was presented and subsequently cleared by the Scientific Review Committee of Pushpagiri

Institute of Medical Sciences and Research Centre, Tiruvalla, following which it was granted approval after analysis by the Institutional Ethics Committee of the institution.

The patients were detailed about the purpose of the study and were included in it after getting an informed consent.

### Eligibility Criteria

1. Adult onset nephrotic syndrome cases were included after confirmation by light microscopy and immunofluorescence.
2. Only adequate biopsies containing at least ten glomeruli were included in the study<sup>(1)</sup>.

The eGFR was calculated using the simplified MDRD formulae available at [https://www.kidney.org/professionals/KDOQI/gfr\\_calculator](https://www.kidney.org/professionals/KDOQI/gfr_calculator).

The renal biopsy specimens were obtained percutaneously by the nephrologist using core biopsy instrument under ultrasound guidance. The renal core was processed and stained with H&E, Periodic Acid Schiff, and Masson's trichrome stain for light microscopy.

Histological parameters studied included glomerular parameters like global glomerular sclerosis, focal segmental sclerosis, mesangial cellularity, thickened glomerular capillary basement membranes and presence of crescents. Tubulo-interstitial parameters recorded were interstitial inflammatory cell infiltration, interstitial fibrosis and tubular atrophy and presence of casts.

Grading of the Histological Parameters

### Glomeruli

- Each glomerulus was examined after taking 3µm sections and presence of global sclerosis, focal segmental sclerosis and periglomerular fibrosis was calculated and expressed as a percentage of the total glomeruli present in the core.
- Mesangial cellularity was calculated taking the average of five mesangial areas away from the vascular pole and graded as in table 1<sup>(9)</sup>. The glomeruli showing increase in mesangial matrix without an associated increase in mesangial cellularity were recorded separately.
- The presence of crescents and basement membrane thickness were assessed on PAS and silver stained sections.

Table 1 : Grading of Mesangial Cellularity

No. of Cells/ Mesangial Area	Grade
Mesangial expansion without increase in cellularity	Mesangial expansion
2/ mesangial area	Normal
3/ mesangial area	Mild
4-5 cells/ mesangial area	Moderate
> 5 cells/ mesangial area	Severe

### Results

Eighty renal biopsies were received at our department during the one and a half year study period. The cases diagnosed as adult onset nephrotic syndrome and which fulfilled the inclusion criteria were selected. Cases were excluded by strictly complying with the exclusion criteria. Thirty two cases were included in the analysis. Membranous nephropathy constituted majority of the cases (21.9%) followed by focal segmental glomerulosclerosis (18.8%). (Figure 1)

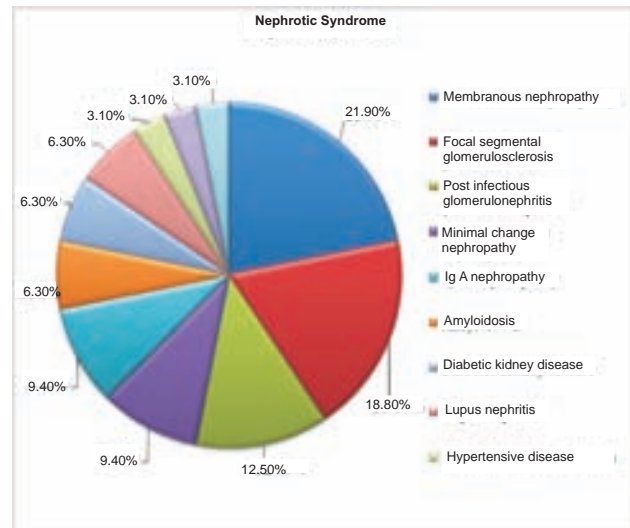


Fig. 1: Distribution According To Type of Nephrotic Syndrome

The overall mean eGFR was 61.28 ml/min. The mean age of the cases was 44.22 years. Moderate correlation was noted between age and eGFR ( $R = 0.363$   $p = 0.045$ ). As the age of the patients increase, there was a tendency for the eGFR to decrease. The ANOVA analysis did not show significant difference between the means. ( $p = 0.108$ )

Table 3: Distribution of the various parameters in the cases according to eGFR

eGFR (ml/min)	>90 N=7	60-89 N=8	30-59 N=11	15-29 N=3	<15 N=3
<b>Age - Mean</b> (standard deviation)	31.7 (19.17)	44.75 (15.53)	44.36 (15.82)	61 (15.72)	54.67 (14.15)
<b>Glomerular Sclerosis - Mean</b> (standard deviation)	10.66 (14.54)	10.16 (7.86)	13.66 (14.17)	14.52 (13.22)	12.56 (4.53)
Sum of global glomerular sclerosis and periglomerular fibrosis (%) -Mean (standard deviation)	11.55 (14.42)	11.63 (10.21)	9.88 (10.76)	14.52 (13.22)	12.56 (4.53)
FSGS (%) - Mean (standard deviation)	3.24 4.51	12.30 25.77	5.79 12.77	1.67 2.89	15.38 26.65
Mesangial cellularity	1	0	1	0	2
Mesangial expansion	2	4	3	1	0
Normal	1	2	7	2	1
Mild	3	1	0	0	0
Moderate	0	8	11	3	3
Severe					
<b>Crescents Present</b>	2	1	4	0	3

The mean global glomerular sclerosis of all the cases was 10.67% with a standard deviation of



10.04(Table 3). The ANOVA analysis did not show significant difference between the means. ( $p=0.962$ )The correlation coefficient with eGFR showed negligible degree of relationship. ( $r=0.183$   $p=0.326$ ).

The mean summative percentage of global glomerular sclerosis and periglomerular fibrosis was 11.37% with a standard deviation of 10.75. The correlation coefficient showed negligible degree of relationship( $r=0.145$   $p=0.436$ ). The ANOVA analysis did not show significant difference between the means. ( $p=0.977$ )

The mean percentage of the cases showing focal segmental glomerulosclerosis was 7.11% with a standard deviation of 16.03.The ANOVA analysis did not show significant difference between the means ( $p=0.705$ ). The correlation coefficient with eGFR showed only negligible degree of relation ( $r =.013$   $p=.944$ ).

The spearman coefficient of correlation showed only negligible degree of relationship of the mesangial cellularity with eGFR ( $r=0.151$  $p=0.418$ ).The chi square test did not show significant association. ( $p$  value= $0.081$ ).

The spearman correlation coefficient showed a moderate degree of correlation of the eGFR with the basement membrane thickening but was not statistically significant( $r= 0.31$  $p= 0.09$ ).The chi square test did not show significant association ( $p$  value  $0.168$ ).

The spearman correlation coefficient showed only negligible degree of correlation of eGFR with the presence of crescents( $r=0.163$   $p=0.382$ ).The chi square test showed near significant association ( $p$  value  $=0.051$ ).

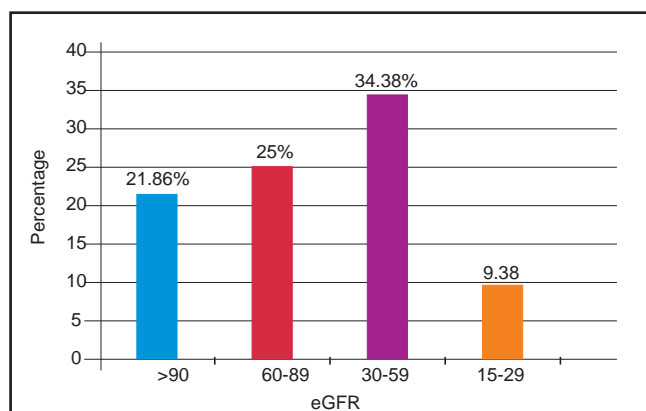


Figure 2: Distribution of cases according to eGFR

## Discussion

Our study was an attempt to correlate the histological features and renal function in the cases of adult onset nephrotic syndrome. Our analysis included 32 cases by strictly adhering to the inclusion and exclusion criteria.

Our study showed a moderate correlation with age which was statistically significant ( $r=-.363$

$p=0.045$ ).Hence, as the age of the patient increases, there was a tendency for the eGFR to decrease. The ANOVA analysis did not show significant association of the age with the eGFR ( $p=0.108$ ). This can be explained on the basis that as age advances there is loss of functioning renal cells and nephron cells. There is also a probability of chronic insult occurring due to subclinical systemic diseases like hypertension . This comes into notice only when there is a substantial decrease in renal function. The importance of immune injury also have been questioned by a few researchers.<sup>(3,4,5)</sup>

The correlation coefficient showed only a negligible degree of relationship between the percentage of glomerular sclerosis and eGFR ( $r=0.183$   $p=0.326$ ).The ANOVA analysis did not show significant association ( $p=0.962$ ). This can be attributed to the fact that the remaining glomeruli enlarge and hyperfunction to compensate for the sclerosed glomeruli. Hence, an appreciable change in renal function occurs only when a large number of glomeruli are sclerosed and the remaining glomeruli cannot withstand the workload.

The correlation coefficient showed only a negligible degree of relationship of summative percentage of global glomerular sclerosis and periglomerular sclerosis with eGFR ( $r=0.145$   $p=0.436$ ).The ANOVA analysis for the association was not significant ( $p=0.977$ ). This was as opposed to the study by Joseph Jenkins *et al* who had concluded from their study that the sum of the percentage of global glomerular sclerosis and periglomerular sclerosis provides a good estimate of renal injury(6). But he had noticed that this correlation exists only in non-diabetic chronic renal injury.

The difference in the correlation can be because our study had included both diabetic and non-diabetic cases. Another reason for the disparity can be attributed to the fact that they had used serum creatinine as estimate of renal injury. Serum creatinine is not considered an accurate estimate of renal function and the changes in the serum creatinine do not necessarily have to be reflected in the estimated glomerular filtration rate.

The correlation coefficient showed only negligible degree of relation between the percentage of focal sclerosis and eGFR ( $r =.013$   $p=.944$ ). The ANOVA analysis did not show significant association ( $p =0.705$ ).Robert A F De Lind *et al*(3) also found only a negligible correlation between segmental sclerosis and GFR in ANCA associated vasculitis. This can also be attributed to the fact that the remaining glomerular tuft hyper-functions to compensate for the loss of function of the sclerosed segment. Also, the absence of focal sclerosis in the renal biopsy does not completely rule out the possibility of the patient having FSGS as these are subject to sample bias.

The coefficient of correlation showed only negligible degree of correlation between the mesangial cellularity and renal function( $r=0.151$ ;  $p=0.418$ ).The chi square test did not show significant association

( $p=0.081$ ). Bob FR et al (7) had also found only found a negligible correlation between the mesangial proliferation and eGFR in patients with glomerulonephritis. In contrast, a study by S. Michael Mauer *et al* (8) showed a moderate correlation between mesangial cellularity and renal function in diabetic kidney disease. The difference can be due to a sample bias as our study had included both diabetic and non-diabetic cases and only few cases showed increase in mesangial expansion.

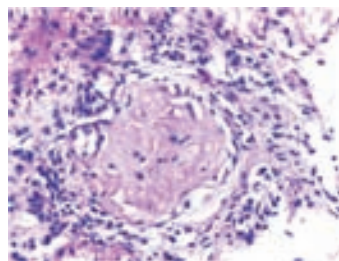
The correlation coefficient showed a moderate degree of correlation between basement membrane thickening and eGFR but was not statistically significant ( $r=0.31$ ;  $p=0.09$ ). There were no statistically significant association by the chi square test ( $p$  value 0.168). The correlation coefficient obtained showed only negligible degree of correlation between the presence of crescents and eGFR ( $r=-0.163$   $p=0.382$ ). The chi square test showed only a near significant association ( $p$  value = 0.051). This was similar to the study by Robert A F De Lind et al. Another finding in their study was a negligible correlation between presence of crescent and GFR in his study of ANCA associated vasculitis. This can be attributed to our small sample size and due to a fact that most of our cases showed only few crescents. A study including more number of cases and stratification based on the number of crescents would help studying the correlation better.

In 1970, Schainuck LI *et al* (9) compared histological parameters with the functional characteristics. The degree of tubulo-interstitial damage determined the extent of concentration ability impairment. A significant relationship between concentrating ability and glomerular disease also appeared to be present. In 1984, Mauer SM et al (8) studied the structural-functional relationship in diabetic nephropathy. They found that mesangial expansion had a strong inverse correlation with creatinine clearance. Five years later in another publication, they highlighted that the peripheral capillary surface area directly relates to the glomerular filtration rate. In diabetes mellitus, the mesangial expansion impinges on the peripheral capillaries, which eventually compromises the filtration surface (10). In 1993, Hattori M et al (11), in their study on type 1 mesangio capillary glomerulonephritis, also inferred that glomerular parameters could predict renal function. They found that the mesangial volume per glomerulus correlated well with serum creatinine and suggested the role of mesangial cellular expansion in the pathogenesis of renal functional disturbances. In 2011, Jenkins J *et al* (6) concluded that the sum of periglomerular fibrosis and globally sclerotic glomeruli correlated with renal function in diabetic patients and attributed their results to the probably nonfunctional glomeruli with periglomerular fibrosis. They suggested that the number of glomeruli with periglomerular fibrosis should be mentioned in the final report as it would provide a better estimate of degree of chronic injury. Pei G et al (12), in 2013, undertook a study of renal interstitial infiltration and tertiary lymphoid neogenesis in IgA nephropathy

to identify predictors of renal outcome. Tertiary lymphoid organs (TLO) are nodular infiltrates of inflammatory cells composed of organized dendritic cells, B and T lymphocytes and other cellular components. TLO showed significant association with serum creatinine levels and severe glomerular, interstitial and arterial lesions. The different inflammatory cells showed differences in correlations with renal function. The density of DC-SIGN+ cells, a special subset of dendritic cells, had the strongest correlation with the serum creatinine levels.

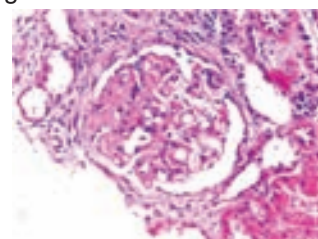
### Glomerular parameters

#### a) Global sclerosis



H&E

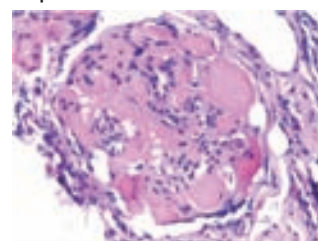
#### a) Focal Segmental Glomerulosclerosis



H&E stained section showing the focal segmental glomerular sclerosis

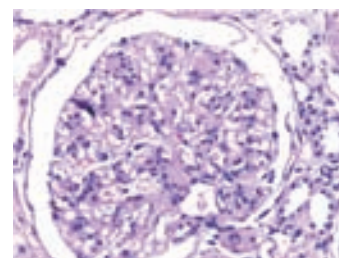
#### a) Mesangial cellularity

##### i. Mesangial expansion



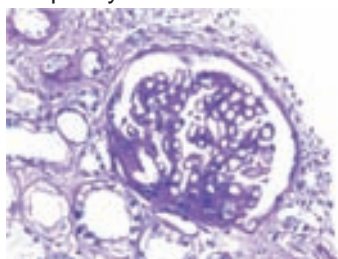
Glomeruli showing increase in mesangial matrix with no associated increase in mesangial cellularity

##### ii. Increase in mesangial cellularity



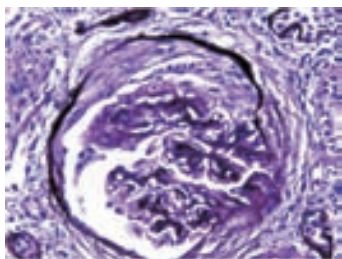
Glomeruli showing an average of >5 cells in the mesangial area- graded as severe. H&E

#### a) Glomerular capillary basement membrane thickness



PAS stained section showing the glomeruli with thickened capillary basement membrane

#### e) Crescents



Methenamine silver stained section showing the three layer fibrocellular crescent

### Conclusion

Our study was done to analyse the structural-functional correlation in adult onset nephrotic syndrome. Although glomerulus is the prime area of attack in nephrotic injury, prior studies had shown that it is the tubulo-interstitial parameters that correlated best with the renal function. Few studies had also suggested correlation of renal function with glomerular parameters. Our study was done in view of the conflicting results by various studies. The most frequent cause of adult onset nephrotic syndrome in our study is membranous nephropathy. Only negligible correlation was noted between the glomerular parameters and eGFR. This can probably be attributed to the remarkable property of the glomerulus to adapt. The remaining glomerul may hyperfunction to maintain the renal function and decline in renal function occurs only when a large number of glomeruli are affected.

Although various studies have been undertaken to understand the pathophysiology leading to the decline in renal function by tubulo-interstitial factors, the pathophysiologic mechanism has not been clearly stated. Activation of the tubular cells can be considered the central event which leads to progression and establishment of a perpetuating cycle which worsens the renal function. The cytokines produced by the activated cells lead to recruitment of inflammatory cells and play a role in tubulo-interstitial fibrosis which again worsens the renal function. Studies aimed at

understanding the exact pathophysiology would help to design targeted therapy. Thus an attempt can be made to halt progression of renal dysfunction. We plan to continue this study by including more number of cases and analyzing tubular, interstitial and vascular parameters.

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## ✦ ORIGINAL ARTICLE

# Psychiatric consultations at a tertiary care Plastic Surgery Centre in a rural district of Kerala - eight months review with categorisation

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## Abstract

**Background:** There are few studies on the co-morbidity of psychiatric disorders among plastic surgery patients. This study aims to review psychiatric morbidity in patients admitted for various plastic surgery procedures. **Methods:** We analyzed all consultations of plastic surgery patients to the psychiatry service over an eight month period from July 2016 to February 2017, in Pushpagiri Medical College Hospital, Tiruvalla, Kerala. **Results:** There was a significant co-existing psychiatric morbidity among the patients referred from plastic surgery. Of the 357 inpatients, 52 patients (15.7%) were referred, of which 40 patients (76.93%) had a psychiatric diagnosis. Among the referred patients, majority (38.4 %) were deliberate self harm (DSH), 15.38% were aggression under influence of alcohol, and 23.07% were RTA related. The major psychiatric diagnoses were major depressive disorder (11.53%), alcohol dependence syndrome (15.38%), adjustment disorders (11.52%), and personality disorders (11.53%). **Conclusion:** There is high prevalence of psychiatric morbidity among referred cases from plastic surgery. We have categorized the psychiatric consultations into five groups of patients based on the cause of injuries and psychiatric morbidity. Teamwork is needed for comprehensive care for these cases.

**Key Words:** Plastic surgery diagnosis, psychiatric morbidity, inpatients,

## Introduction

There has been a rise in the emotional and behavioral problems among patients admitted for various plastic surgical procedures. An increasing recognition of psychiatric issues in surgical patients coinciding with recent inclination towards dedicated psychological medicine services in general hospitals<sup>(1)</sup>. The initial management of patients with deliberate self harm (DSH) is often done by the plastic surgeons. So plastic surgeons may act as gatekeepers in referring these patients for further speciality care<sup>(2)</sup>.

Mainly patients with burns, lacerated wounds, injuries under influence of alcohol and facial cosmetic surgeries were referred for psychiatric management<sup>1</sup>. The left forearm was the most common site of injury<sup>(3)</sup>. Liaison psychiatry refers to the branch of Psychiatry involving assessment and treatment of referred patients in the general hospital, like in the casualty, or patients of deliberate self harm (DSH)<sup>(4)</sup>. These patients should be under multi disciplinary care.

They must be assessed by the psychiatric team to prevent any delay in the start of psychiatric treatment which is especially important in patients with deliberate self harm because of the increased risk of injury and suicide<sup>(2)</sup>. A few studies have systematically analysed the psychiatric morbidity in a general plastic surgery patient population<sup>(1)</sup>.

Pushpagiri Medical College is a 1200 bedded postgraduate teaching hospital in the rural district of Pathanamthitta, Kerala, India. The Plastic and Reconstructive Surgery department has been functioning here for 22 years and the department of psychiatry has been there for the last 32 years. This paper aims to present an overview of patient referrals from department of plastic surgery to the department of psychiatry in Pushpagiri Medical College.

## Materials and Methods

Details of all consultations given from Plastic Surgery to Psychiatry between 1<sup>st</sup> August, 2016



and 28<sup>th</sup> February, 2017 in Pushpagiri Medical College were recorded on a database. We undertook a retrospective study of the case-sheets; surgical and psychiatric medicine notes were also analyzed. The following details were noted:- socio-demographic measures, plastic surgery diagnosis, psychiatric diagnosis and outcome. The injuries were classified as cut injuries, crush injuries and road traffic accidents. The cause and type of injury and the surgical procedure were noted.

The injuries were categorized into major, moderate and minor. Major injuries were those with significant neurovascular injury or significant functional deficit. Minor injuries had good functional recovery.

Statistical analysis was undertaken using a categorical descriptive comparison between patient groups.

## Results

**Table 1:** Total no. of patients

Total no. of inpatients in Plastic Surgery ( 8 months)	357
No. of inpatients referred to Psychiatry	52 (14.56%)

During the period from July 1<sup>st</sup>, 2016 to February 28<sup>th</sup>, 2017, 357 patients were admitted for various plastic surgery procedures. Fifty two of these plastic surgery inpatients were referred for psychiatric consultation, comprising 14.56 % of the plastic surgery inpatient admission during those 8 months. (Table 1)

**Table 2 -** Sociodemographic details

Age in Yrs.	n (%)	Gender	n(%)	Marital Status	n (%)
11-19	4 (7.7)	Male- Female -22	30 (57.6)	Married Unmarried	35 (67.3)
20-29	19 (36.5)				
30-39	13 (25)				
40-49	08 (15.4)				
50-59	05 (9.7)				
60+	03 (5.7)				

Table 2 demonstrates the socio-demographic details showing that the patients were mainly in the younger age group 69.22% <40 yrs, married ( 67.3%) and males (57.6%)

**Table 3:** Degree of injury

Degree of injury	n(%)
Major	32 (59.6)
Moderate	10 (19.2)
Minor	11 (21.2)

Table 3 demonstrates the degree of injury. Major injuries constitute 59.6 %, moderate 19.23 % and minor injuries 21.15 %.

**Table 4:** Cause of injury

Cause of injury	n(%)
DSH	20 (38.4)
Aggression under influence of alcohol	08 (15.4)
Assault	03 (5.8)
Accidental	02 (3.8)
RTA	12 (23.1)
Cancer	01 (1.9)
Workplace	06 (11.6)

The most common type of injuries were self cut injuries (DSH) 38.4%; the other causes of injuries were aggression under the influence of alcohol 15.38% ; assault 5.76 %; accidental injuries 3.8% ; RTA 23.07%; cancer 1.92% and workplace injuries 11.54%. (Table 4)

**Table 5 :** DSH( Deliberate self harm)

Gender	n(%)	Table 5 : DSH (Deliberate self harm) Degree of injury	n(%)	No. of injuries	
Male	06 (30)	Severe	16 (80)	Single	16 (80)
Female	14 (70)	Mild	04 (20)	Multiple	04 (20)

Among the patients admitted with deliberate self harm 70% are females and 30% are males. 80% of the injuries are major and 20% are minor. Of the DSH injuries 80% had single cuts and 20% had injuries on multiple sites.(Table 5)

**Table 6 :** Surgical procedures

Surgical procedure	n(%)
Primary closure	03 (5.8)
Tendon repair	02 (23.1)
Microvascular surgery	11 (21.1)
Nerve surgery	09 (17.3)
Wound debridement	11 (21.2)
Skin graft	04 (7.7)
Conservative management	02 (3.8)

Among the 52 patients, 3.84% were managed conservatively; All the rest of the injuries had to undergo major procedures like microvascular surgery (21.15%), tendon repair (23.07%), nerve surgery (17.3%) and multiple wound debridements (21.15%).

**Table 6 :** Duration of hospitalization

Duration of Stay	n(%)
0 -10	27 (51.9)
11 - 20	11 (21.2)
21 - 30	07 (13.5)
31 - 40	04 (7.7)
41 - 50	02 (3.8)
51 - 60+	01 (1.9)

Considering the duration of stay, 51.92% had hospitalization below 10 days, 34.61% below 30 days and the rest 13.45% had prolonged hospitalization. (Table 6)

**Table 7 : Psychiatric diagnosis**

Cause of injury	n(%)
Major depressive disorder	06 (11.5)
Alcohol dependence syndrome	08 (15.4)
Alcohol withdrawal delirium	04 (7.7)
Adjustment disorder	06 (11.4)
Personality disorders	06 (11.4)
Bipolar mood disorder	04 (7.7)
Schizophrenia	01 (1.9)
Polysubstance abuse	02 (3.8)
Acute stress reaction	02 (3.8)
Obsessive compulsive disorder	01 (1.9)
ICU delirium	04 (7.7)
No current psychiatric diagnosis	08 (15.4)

65.29% patients had major psychiatric disorders like major depressive disorders, alcohol dependence syndrome, adjustment disorders, bipolar mood disorders, schizophrenia, polysubstance abuse, acute stress reaction and obsessive compulsive disorders. 11.53 % had personality disorders, 7.69% had ICU delirium and 15.38% had no specific psychiatric diagnosis. (Table 7)

## Discussion

According to our study 15.7 % of the 357 inpatients admitted for plastic surgery procedures needed psychiatric referrals. As per the study of Mc Lear et al the rate of inpatient referral was 3.3 %<sup>(1)</sup>. A Dutch psychological medical service had stated a referral rate between 1.4% and 3.4%<sup>1</sup>. This shows a higher referral rate in our centre, compared to the other studies which are western based. The ease of availability of psychiatry service in our hospital may explain the higher referral rates.

Considering the cause of injury in this study deliberate self harm (DSH) constitutes 38.4% of all referrals to psychiatry service. In the study by Mc Learie et al DSH rate was around 40% of all psychiatry referrals<sup>(1)</sup>, which is almost similar to our study. The next common cause of injuries was RTA and workplace injuries (34.6%). Alcohol related problems occupy 15.38% reflecting the higher prevalence of alcohol dependence in this society.

In this study DSH attempts were predominantly high among females occupying 70% of DSH. In the study by David Gunnell *et al* also showed a female predominance.

80% of the DSH cuts were severe, as these patients were directly referred for plastic surgery services. 20% of the DSH injuries were at multiple sites showing high suicidal intent.

Most of the referred patients needed major procedures like microvascular surgery, tendon and nerve repairs. In contrast, in the study by Mc Learie et al, skin grafting was the most common surgical procedure<sup>(1)</sup>.

In this study, the duration of stay was less than 10 days in majority of the patients (51.92%), which goes in hand with the study of Mc Learie *et al*, where 44% of the patients had less than 10 days hospitalization reflecting the acute nature of the injuries<sup>(1)</sup>.

In this study there is no referral from burn patients as this plastic surgery unit has less intake of burn patients, in contrast to the Mc Learie et al study which has a 31% referral from burn patients<sup>(1)</sup>.

In our study a high proportion of the referred patients had a psychiatric diagnosis (76.93%), which is comparable to the Mc Learie study 69%<sup>(1)</sup>.

Among the psychiatric diagnosis, major depressive disorders occupy 11.57% which is similar to the findings in the Mc Learie study (13%)<sup>(1)</sup>. Alcohol dependence syndrome and withdrawal delirium constitute 23.07% of the patients showing the higher incidence of alcohol related aggressive injuries. The incidence of adjustment disorders is 11.53 % in this study which is similar to the Mc Learie study where it is 12%<sup>(1)</sup>. Personality disorders prevail among 11.53 % of these patients.

Based on this study we have categorized common areas of psychiatric co-morbidities in plastic surgery patients as follows:

- 1) DSH attempt as a consequence of psychiatric morbidity
- 2) Aggressive injuries as a consequence of alcohol dependence syndrome
- 3) Complications in alcohol withdrawal disorders
- 4) Personality disorders
- 5) ICU delirium and acute stress reaction

## Conclusion

According to this study there is definite evidence of psychiatric morbidity in patients referred from the plastic surgery department. Psychiatric referrals from plastic surgery can be grouped based on psychiatric co-morbidity. A teamwork is needed for the comprehensive management of these patients.

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## ✦ CASE REPORT

### Early oral surgical intervention for a neonate with extensive oral synechia.

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#### Abstract

Bartsocas Papas Syndrome (BPS) is an autosomal recessive disorder characterized by severe popliteal pterygia, ankyloblepharon, filiform bands between the jaws, cleft lip and palate, and syndactyly<sup>(1)</sup>. It is synonymous with lethal popliteal pterygium syndrome (BPS, OMIM #263650). Most of the cases die perinatally or a few months after birth, although occasional survival has been reported<sup>(2)</sup>. This syndrome has been earlier reported in various parts of the world like Bedoin community in Qatar and in Egypt<sup>(3, 4)</sup>. Only few cases have been reported from India<sup>(5, 6)</sup>. We report a neonate of with extensive oral synechia who had others features consistent with a diagnosis of BPS belonging to a 3<sup>rd</sup> degree consanguineous family in Kerala.

**Keywords:** Bartsocas Papas Syndrome, oral synechia

#### Case report

A female neonate was referred to our Unit on Day 7 of life from an orphanage in view of severe craniofacial anomalies and feeding difficulties. The baby was firstborn to healthy 3<sup>rd</sup> degree consanguineous couple, aged 27 years (father) and 19 years (mother). Antenatal scans done as well as amniotic fluid volume was normal. There is history of acquiring varicella around 16 weeks of gestation for which acyclovir was taken. No decrease in fetal movements was appreciated. The baby was born vaginally with a birth weight of 2.4 kg and was reported to have not cried after birth, however Apgar Score was not known.

On examination, the baby was having a weight of 2.240 kg and head circumference of 33 cm. She had multiple craniofacial anomalies, limb anomalies, anogenital and ectodermal anomalies. Craniofacial anomalies comprised of bilateral cleft lip with downward slanting angle of mouth, filiform bands between the jaws (syngathia), flattened nose, small nares bilaterally, ankyloblepharon, hypertelorism, nocturnal lagophthalmos, low set ears, narrow external auditory canal. Limb anomalies comprised of bilateral syndactyly of all fingers (mitten hands), flexed fingers,

two single palmar creases. Lower limb had syndactyly of all toes of left and second to fifth toe in right and club foot was present bilaterally. The nails were absent in all fingers and toes except for one rudimentary nail in each foot. Multiple skin pits were found at dorsal aspect of hands and feet at sites of absent nails. The most prominent feature of the syndrome was a large popliteal pterygium in bilateral lower limbs from ischium to heel. At birth both lower limbs were attached to clitoris which were surgically separated on Day 4 of life. Anogenital anomalies in the baby comprised of absent labia majora, clitoral hypertrophy, a vestigial tail of 5 mm in size present 5 mm distal to anal opening. Ectodermal anomalies were in the form of dry skin, absent eyebrows and eyelashes, and woolly sparse. Other anomalies in the neonate were widely spaced nipples, supernumerary nipples bilaterally and low set umbilicus.

Sepsis screen was negative and the baby was maintaining normoglycemia. Abdomen, pelvic and cranial ultrasound were normal. Echocardiograph was normal. Xray chest and abdomen showed no bony or soft tissue abnormality. Xray of limbs revealed 4 metatarsals and metacarpals with no other apparent spine and limb anomalies.

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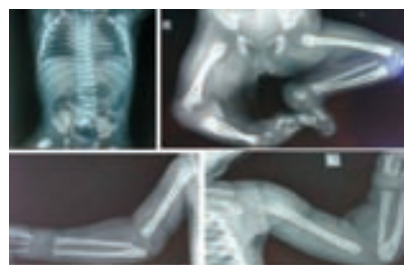




The baby was started on nasogastric feeds which were well tolerated. On Day 10 flexible endoscope was put beyond filliform adhesions in mouth to have a look at the interior of mouth and feasibility of a surgical correction. On Day 12 of life filliform adhesions of lips and jaws were released surgically under local anaesthesia. The interior of mouth as evident after surgery revealed small hypoplastic tongue situated posteriorly in oral cavity, hypoplastic maxilla and mandible, bilateral cleft palate and salivary pits present bilaterally in floor of mouth. Palladay feeding was gradually introduced and the baby was discharged at a weight of 2.765kg on Day 35 in a stable condition on palladay feeds.

## Discussion

Bartsocas and Papas in 1972 first reported this syndrome, a lethal autosomal recessive variant of popliteal pterygium syndrome (1). Clinical features include severe popliteal webbing, oligosyndactyly, genital abnormalities, ectodermal anomalies and typical face with craniofacial anomalies (4). The neonate described in this report had all the characteristic features of BPS. Other clinical features previously reported in literature like low birth weight, supernumerary nipples, widely spaced nipples, low set umbilicus, low set ears were also present in our case (4,5,7). However the baby in addition had a tail like appendage and narrow external auditory meatus which has not been reported in literature in BPS. Third degree consanguinity in parents points towards an autosomal recessive inheritance.



BPS is caused due to mutation in RIPK4, a direct transcriptional target of the protein p63, a master regulator of stratified epithelial development, which acts as a nodal point in the cascade of molecular events that prevent pterygium syndromes (8).

Most cases die in utero or in early weeks of life, the oldest being 13-year-old(2). Respiratory tract infections and sepsis have been reported as the cause of deaths. Lack of establishment of oral feeds and consequent weight loss can also be fatal in these patients. Antenatal diagnosis is possible as early as first trimester using transvaginal ultrasound(9). Due to its lethal nature, early antenatal diagnosis an option for termination of pregnancy should be discussed with parents. However if born, more cases of Bartsocas Papas syndrome may survive beyond the neonatal period if proper neonatal care and early oral surgical intervention is undertaken to establish oral feeds followed by remaining reconstructive surgeries at a later date after appropriate weight gain. This baby is now nine months old and gaining weight.

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## ✦ CASE REPORT

### Solitary fibrous tumor of pleura

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#### Abstract

Solitary fibrous tumor is a relatively rare primary neoplasm of pleura which is of mesenchymal origin. It can be benign or malignant. Solitary fibrous tumor can often grow to a large size before causing symptoms. Radiological evaluation by various diagnostic modalities aids in the diagnosis of solitary fibrous tumor. However definite diagnosis can be made only on the basis of histopathological examination and immunohistochemical analysis. Presenting a case of solitary fibrous tumor of pleura (SFTP) in a 74 year old male. Clinical, radiographic findings and pathologic correlations are provided.

**Keywords:** computed tomography; pleura; solitary fibrous tumor of the pleura; tumor

#### Introduction

Solitary fibrous tumor of the pleura (SFTP) is a mesenchymal tumor that tends to involve the pleura, and has also been described in other thoracic areas such as mediastinum, pericardium, pulmonary parenchyma and extra thoracic sites. It was first described by Klemperer and Rabin in 1931. A peripheral mass abutting the pleural surface, to which it is attached by a broad base or by a pedicle that allows it to be mobile, is the usual presentation. Both benign and malignant forms exist. We can arrive at a precise pre-operative diagnosis with a cutting-needle biopsy, although most cases are diagnosed with post-operative histology and immuno-histochemical analysis.

#### Case report

A 74 year old male, with a history of extra parenchymal lesion in the left hemi thorax diagnosed eight years back, on imaging follow up, presented to our department with complaints of cough & hemoptysis since two months. There was no history of occupational exposure, including asbestos.

Physical examination revealed decreased breath sounds and dull note on percussion over the base of the left lung. Laboratory test findings were within normal limits. Plain chest radiograph (Fig.1) demonstrated a

homogeneous well demarcated radio opaque shadow in the region of the left lower zone, part of which was silhouetting the left cardiac border.



Fig.1 Chest X-ray PA view showing homogeneous well demarcated radio opaque shadow in the region of the left lower zone, which is silhouetting the left cardiac border and diaphragm

CT Chest taken eight years prior revealed a lentiform shaped heterogeneous area showing solid & cystic components seen in the left lower zone posterolaterally measuring 8x11cm. The lesion showed broad base towards pleura and the diaphragm.

Present CT study (Fig.2) revealed a large ovoid, lobulated, solid lesion measuring 15 x 12 cm seen filling the inferior aspect of left hemi thorax. Multiple foci of calcifications were noted in the periphery of the lesion with mild enhancement. The lesion was in contact with the intercostal pleura and was seen to push the diaphragm inferiorly.

Significant intra-abdominal mass effect with displacement of stomach, spleen and kidney were noted.

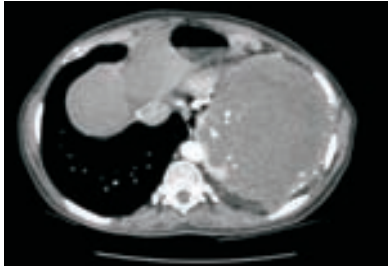


Fig 2. CECT chest showing large ovoid, lobulated solid lesion in the inferior aspect of left hemithorax with foci of calcifications within it.

Possibility of solitary fibrous tumor or atypical lung malignancy was considered based on imaging.

Patient underwent CT-guided transthoracic biopsy which revealed a fragment of skeletal muscle with adjacent extensively hyalinised tissue containing few interspersed spindle shaped cells with elongated nuclei and scanty cytoplasm. (Fig. 3, 4) Based on the histology a possible diagnosis of solitary fibrous tumor of pleura was made.

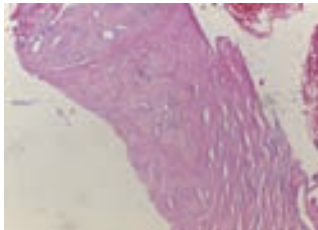


Fig 3. Low power microscopy: extensively hyalinised tissue containing few interspersed spindle shaped cells with elongated nuclei and scanty cytoplasm

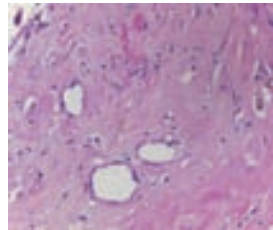


Fig 4. High Power microscopy: spindle shaped cells with elongated nuclei and scant cytoplasm. There are scattered thin walled vascular channels and lymphocytes in the stroma

## Discussion

Solitary fibrous tumors are rare primary pleural tumors which are derived from pluripotent submesothelial cells<sup>(1,2)</sup>. Even though most of the solitary fibrous tumors are benign tumors, approximately 12% can be malignant<sup>(2)</sup>. They can occur at intrathoracic sites (arising from pleura, lung, mediastinum) and extra thoracic sites (such as the meninges, nose, oral cavity, pharynx, epiglottis, salivary glands, thyroid, breast, kidneys, bladder, and spinal cord)<sup>(3,4)</sup>. Intrathoracic SFT usually presents in the 6<sup>th</sup> to 7<sup>th</sup> decade with both sexes equally affected<sup>(2)</sup>. The clinical features depend on site, size and malignant potential of the tumor. Since most of them are benign, they follow an indolent clinical course and can remain asymptomatic for several years<sup>(5,6)</sup>. When symptomatic, they can present with cough, dyspnoea and chest pain. Sometimes SFT of pleura can be associated with some interesting extra thoracic manifestations like hypoglycemia due to elaboration of insulin growth factor and hypertrophic pulmonary osteoarthropathy with or without digital clubbing<sup>(7)</sup>.

SFT mostly arises from visceral pleura either as a sessile mass or pedunculated mass and grow outwardly into pleural space, whereas malignant variants arise from the parietal pleura and grows inwards. The likely hood of malignancy increases with those SFT which are sessile, symptomatic and associated with pleural effusion<sup>(1)</sup>.

Radiological evaluation can be done using chest X ray, ultrasound, CT and MRI. Chest X ray even though nonspecific is the initial diagnostic modality and shows a well circumscribed soft tissue mass with acute or obtuse angle with the chest wall. It can be very large and may occupy half of the hemithorax. On ultrasound, SFT can appear as hypo-echoic or heterogeneous mass, particularly those with degeneration, and also helps to establish the intrathoracic location of this tumor. Doppler study of the lesion may not show colour flow even though they are highly vascular tumor<sup>(9)</sup>.

CT scan remains the investigation of choice for SFT even though there are no specific characteristics for the diagnosis of the same<sup>(10)</sup>. But it helps in assessing the size, location of the tumor, resectability of the tumor and its relationship to the neighboring structures. SFT appears as a well circumscribed rounded tumor with homogenous density. Depending on the amount of collagen it can appear as hypo or hyperdense with increasing collagen content causing more hyperdensity. Occasionally dense calcifications may be seen<sup>(11)</sup>. Tumor enhancement can be variable with 100% of malignant and 60% of benign SFT showing heterogeneous enhancement<sup>(9)</sup>. But these findings are not specific for SFT and can be present in other tumors also<sup>(12)</sup>. Also by CT imaging alone it is difficult to distinguish benign from malignant SFT and also to differentiate SFT from other tumors arising from mediastinum or chest wall.

MRI would be useful in terms of assessing the invasion to adjacent structures. MR imaging would show signal intensities of a fibrous tumor with low signal intensity on both T1 and T2<sup>(13)</sup>. The ability of PET to differentiate SFT from mesothelioma is doubtful<sup>(14)</sup>. Preoperatively definitive diagnosis of SFT can be made by only percutaneous transthoracic needle biopsy. The choice of treatment is always surgery. Complete excision of the tumor at the primary level itself provides the best clinical outcome<sup>(15)</sup>.

Histologically SFT is composed of spindle cells, which are arranged in interlacing fascicles or have a short storiform arrangement, a so-called patternless pattern. Myxoid, fibrotic, and hyalinized changes can occur<sup>(16)</sup>. In some cases, SFT may have vascular features of hemangiopericytoma<sup>(17)</sup>. The diagnosis can be confirmed by immuno-histochemistry. SFT is positive for CD34 which is negative in most other tumors like mesothelioma and sarcomas. Also SFT is positive for vimentin, CD99 and negative for cytokeratin and S-100.



SFT strongly express bcl-2, which can be used for diagnosis of SFT with negative CD34<sup>(2)</sup>. Malignant SFT are usually more than 10cm in diameter and microscopically they shows high cellularity, pleomorphism, hemorrhage, mitotic activity (more than 4 mitotic figures per 10 high power fields) and necrosis (18, 19).

Prognosis of benign SFT with complete excision is highly satisfactory<sup>(10)</sup>. Complete excision reduces the chance of recurrence. However a long term follow-up is essential as there is always chance for late recurrence. Recurrence rates were found to be more with sessile tumors than pedunculated tumors<sup>(2)</sup>. Malignant SFT has less favourable outcome with local invasion, recurrence and metastasis.

Complete surgical resection of the tumor with careful clinical and radiological follow ups are mandatory for both benign and malignant SFT.

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## ✦ CASE REPORT

### Imaging findings of post traumatic Cerebral fat embolism

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### Abstract

Cerebral fat embolism is a relatively rare complication of major skeletal trauma and it forms a part of the spectrum of manifestations called “fat embolism syndrome” which also includes respiratory and cutaneous manifestations. Here we describe a patient admitted with long bone fracture who subsequently developed visual symptoms and on evaluation was found to have cerebral fat embolism.

**Keywords:** Cerebral fat embolism, Fat embolism syndrome

### Introduction

The phenomenon of fat embolism occurs in upto 90% of the patients subjected to major skeletal trauma. However symptomatic fat embolism syndrome which refers to a triad of respiratory, cutaneous and neurological manifestations is rare with reported incidence of 0.9%–2.2%<sup>(1)</sup>. The incidence is reportedly less in children as compared to adults due to a greater predominance of hematopoietic tissue in the bone marrow as compared to fat<sup>(2)</sup>.

### Case report

19 year old male patient presented with a history of road traffic accident and on evaluation was found to have a fracture of tibia, confirmed by appropriate x-rays. He was planned for closed reduction and internal fixation. The next day he developed visual agnosia and apathy. There was no breathing difficulty or petechial rashes. He underwent MRI study of brain along with 3D TOF angiography on a 1.5 T GE Signa MRI machine. MRI revealed multiple tiny foci of diffusion restriction along the grey and white matter in predominantly fronto parietal distribution (Fig. 1, 2).

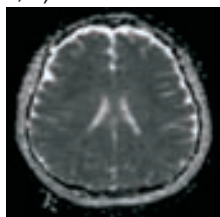


Fig.1 Multiple tiny foci of diffusion restriction along the grey and white matter in predominantly fronto parietal distribution

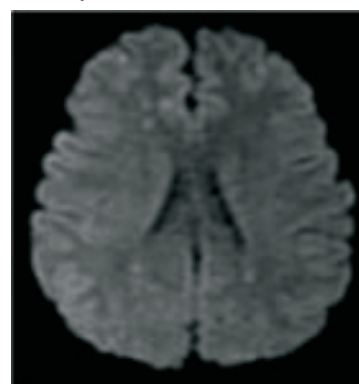


Fig. 2 Multiple tiny foci of diffusion restriction along the grey and white matter in predominantly fronto parietal distribution

A peripheral smear done for this patient showed fat vacuoles, normocytic, normochromic RBCs, relative neutrophilia and thrombocytopenia (Fig. 3).

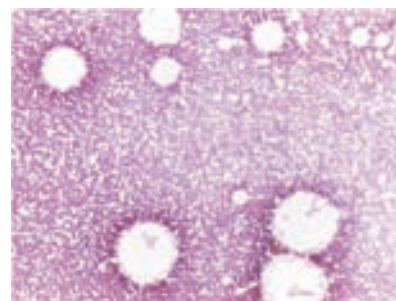


Fig. 3 Peripheral smear done for this patient showing fat vacuoles

The presence of fat in blood stream was further confirmed by centrifuging the blood sample and oil red staining of supernatant (Fig. 4).

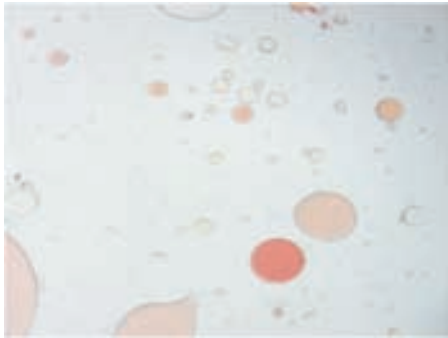


Fig. 4 Centrifuged blood sample showing oil red staining of supernatant fat

Patient underwent closed reduction and internal fixation with conservative management for the fat embolism and was discharged home in a stable state without any residual neurological deficits.

## Discussion

Fat embolisation occurs in a large majority of patients undergoing major skeletal trauma, following orthopaedic surgeries, burns and even following non traumatic conditions like pancreatitis<sup>(3)</sup>. However only a small minority presents with features of fat embolism syndrome that includes neurological, cutaneous and respiratory manifestations typically 24-72 hours after the inciting trauma. Some studies have claimed definite benefit from steroid administration in the prevention of fat embolism syndrome in patients at high risk<sup>(4)</sup>.

Cerebral fat embolism may present with a myriad of neurological symptoms ranging from apathy, confusion, altered sensorium, delirium, seizures and coma. Associated breathing difficulty and petechial haemorrhages may be seen on skin surface predominantly over head, neck and upper limbs. Clinical evaluation and diagnosis of fat embolism syndrome is made by GURD's criteria<sup>(5)</sup>.

Exact pathophysiology remains unknown although there are two proposed mechanisms. The earlier mechanical theory which proposed blockade of capillaries by fat globules leading to local ischemia and release of inflammatory mediators failed to explain how fat globules bypassed the pulmonary circulation en route to cerebral vasculature. A second theory was proposed which offered a biochemical explanation whereby hydrolysis of triglycerides and free fatty acids gives rise to toxic intermediaries leading to endothelial damage and increased permeability of capillaries<sup>(5)</sup>.

Hematological studies may reveal anemia and thrombocytopenia, increased ESR, hypofibrinogenemia and prolonged Prothrombin time<sup>(6)</sup>. Binding of free fatty acids may cause hypocalcemia and elevated serum lipase<sup>(7)</sup>.

On imaging CT thorax shows ground glass opacities, interlobular septal thickening, nodular deposits and rarely filling defects in pulmonary arteries. Plain CT brain is usually inconclusive in the absence of other trauma related intracranial injuries. MRI study of brain shows multiple foci of diffusion restriction in a random embolic distribution typically called "star field" pattern. SWI may show multiple microhemorrhages. However recent case reports have elucidated the presence of other patterns of involvement in addition to the most common and well known diffuse scattered cytotoxic edema as detailed by Kuo et al in a metanalytic review<sup>(8)</sup>. These other patterns include (1) confluent cytotoxic white matter edema (2) areas of vasogenic edema that may enhance (3) petechial microhemorrhages in white matter and (4) chronic manifestations like sequelae of infarction, cavitation, scar formation, gliosis, or chronic demyelination. However these changes are not specific to fat embolism and may be confused with systemic embolization, disseminated infections, hypoxic leukoencephalopathy, toxic leukoencephalopathy, hypoglycemic encephalopathy and diffuse axonal injuries and requires clinical correlation.

The overall clinical prognosis of cerebral fat embolism remains good except in fulminant cases although rarely complications such as brain death has been reported<sup>(9)</sup>. Other concomitant injuries may complicate recovery. Overall mortality is reported to be 5 to 15% cases although most patients recover fully.

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## ✦ CASE REPORT

# An unusual case of bilateral endogenous endophthalmitis

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Rosu George Mathew  
Digin Mariam Joseph

## Abstract

We report the case of a 75 year old female who presented with sudden onset of swelling & redness of both eyes associated with pain and decreased vision. There was proptosis of both eyes with tense eyeballs. Vision was markedly reduced and there was severe lid edema and chemosis. There was total hyphema and the rest of the details couldn't be visualised. A diagnosis of bilateral panophthalmitis was made.

**Keywords:** panophthalmitis, endogenous endophthalmitis, aeromonas hydrophila

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## Introduction

Endophthalmitis is a severe form of intraocular inflammation involving ocular cavities and their immediate adjacent structures. If the inflammation extends to the outer coats, then it is termed as panophthalmitis. This case was an unusual presentation of endophthalmitis as the patient presented with bilateral hyphema with marked proptosis, severe chemosis and restriction of eye movements in all directions. This case is being presented because of the rarity of the cause of endophthalmitis. ie. *Aeromonas hydrophila* (endogenous)<sup>(1)</sup>

## Case report

75 year old female, a known case of diabetes mellitus, hypertension, dyslipidemia, hypothyroidism, coronary artery disease presented with swelling and redness of both eyes associated with pain and decreased vision which rapidly progressed to loss of vision. No history of trauma to eye, drooping of lids or double vision. There was proptosis of both eyes with total limitation of extraocular movements. Both eyeballs were tense. There was no perception of light in left eye while it was maintained in right eye. There was marked lid edema in both eyes with minimal discharge. Conjunctiva was severely chemosed with marked congestion. Cornea was clear and there was total hyphema in both eyes. The rest of the details couldn't

be visualised because of the hyphema including fundus examination.

The differential diagnosis that were considered at this stage were cavernous sinus thrombosis, intracranial bleed, bilateral orbital cellulitis and bilateral panophthalmitis. MRI brain showed mild intraconal fat stranding, preseptal edema and mild post contrast enhancement of left inferior rectus muscle. There was no evidence of cavernous sinus thrombosis. (Fig. 1&3)

All the blood investigations were within normal limits except for an elevated Total Count, RBS and HbA1C. Blood culture showed Staphylococci, group B beta haemolytic streptococci and *Serratia marcescens*. Venous doppler of superior ophthalmic vein showed decreased flow in both eyes, left more than right.

The patient was started on iv antibiotics, steroids and anti-glaucoma medications

MRI orbit revealed orbital cellulitis and endophthalmitis, left more than right. Both eyes perforated spontaneously and bilateral evisceration was done. (Fig. 2) The specimen was sent for culture & sensitivity which showed *Aeromonas hydrophila* from both eyes.





Fig. 1 Right maxillary sinusitis Left inferior rectus thickening



Fig. 2 Liquefied contents per-operatively

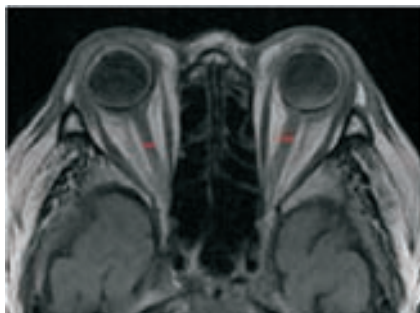


Fig. 3 Thickening of left optic nerve

## Discussion

As the patient presented with bilateral total hyphema, the initial differential diagnoses considered were intracranial bleed, cavernous sinus thrombosis. After ruling out these conditions, treatment was started for orbital cellulitis/panophthalmitis<sup>(2)</sup>.

Panophthalmitis is a severe form of intraocular inflammation involving the ocular cavities, their contents, their immediate adjacent structures, outer ocular coats and Tenon's capsule<sup>(3)</sup>.

Of the total endophthalmitis, only 2-8 % is due to endogenous causes. Apart from the fact that only 0.5-2 % of total endophthalmitis presents with bilateral symptoms, bilateral hyphema is also an atypical presentation of endophthalmitis<sup>(4,5)</sup>.

Bilateral presentation of endogenous endophthalmitis is a rare entity and the causative organism, ie, *Aeromonas hydrophila* makes this an even more exceptional case. According to literature, only 2-3 cases of endogenous endophthalmitis due to *Aeromonas hydrophila* has been reported worldwide<sup>(6,7)</sup>.

*Aeromonas hydrophila* is a gram negative rod which can cause conjunctivitis, keratitis, endogenous/exogenous endophthalmitis, orbital cellulitis especially in immunocompromised patients. In this patient, the rapid progression from a bilateral total hyphema to spontaneous perforation within two days itself shows the high virulence of the organism<sup>(8)</sup>.

Treatment mainly includes systemic antibiotics, intra vitreal antibiotics, anti inflammatory and supportive measures like anti glaucoma medications and cycloplegics.

Vitrectomy has been found to be effective in early endophthalmitis cases.

To conclude, early diagnosis and management is crucial in case of endophthalmitis as it can result in evisceration.

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