Official Publication of Pakistan Association of Plastic Surgeons

PJPS

PAKISTAN JOURNAL OF PLASTIC SURGERY

www. pjplasticsurgery.com
ISSN #: 2307-213X

House No. 557-B II,
Model Town-B, Multan Road, Bahawalpur.
Clinic: 062-2883456 Fax: 062-2884566
Mobile: 0300-9680481, 0321-6815009

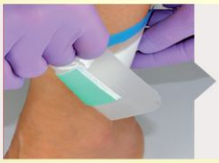
Volume 5 Number 2
July 2017

FOCUSING ON FUTURE IN PLASTIC SURGERY & AESTHETICS

PROVIDING LATEST TECHNOLOGIES

In Burns, Wound Care and Scar Management

ALLOPLASTIC ABSORBABLE
SKIN SUBSTITUTE
Lacto-Capromer terpolymer
Intelligent wound care



Sorbact
A Natural Method for
Wound Management
Instant & Selective Binding of
Hydrophobic Microorganism

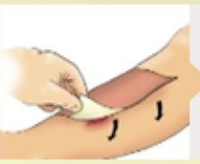
ALHYDRAN
Medical after care for the Skin
The new standard in the after care
of Burns, Scars and fragile Skin

BapScarCare
New Generation SILICON
SCAR TREATMENT

Algivon
Alginate dressing impregnated
with100% Manuka honey

Actilite
Non- adherent viscose
net dressing coated with 99%
Manuka honey & 1% Manuka oil

Advazorb
Hydrophilic foam
dressing range

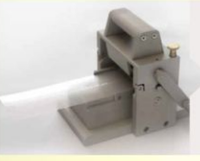


Eclypse
Super absorbent dressing
Absorbs fluids, not your budget

MEEK TECHNOLOGY

CORDLESS BATTERY
OPERATED DERMATOMES

SOBER HAND
DERMATOME



MESHER

Davies
Electric Dermatome

FDA APPROVED
BREAST & GLUTEAL
IMPLANTS (BELLAGEL)

BiOwel Sciences
The Wound Experts

275, Street # 55, I-8/3, Islamabad - Pakistan. [P] +92 51 48 600 56 [F] +92 51 48 600 57
info@biowelsciences.com | www.biowelsciences.com

PJPS
PAKISTAN JOURNAL OF PLASTIC SURGERY
ISSN #: 2307-213X
Volume 5 Number 2 July 2017

CONTENTS

ORIGINAL ARTICLE

Gastrocnemius Muscle Flap Coverage of Chronically Infected Knee Joints

Dr. Munir Alam, Mr. Brian Kneafsey

ABSTRACT

Chronically infected open knee joints present difficult problem. Aggressive debridement of chronically infected soft tissue and bone, irrigation and extensor mechanism reconstruction with achillis tendon graft and definitive muscle flap closure is our preferred approach (1,3). For patients with chronic infection, extensive scarring or soft tissue defects around the knee joint, transposition of the gastrocnemius muscle should be considered, because of its constant anatomy, easy dissection, versatility and moulding features combined with an excellent immunocompetence related to the high oxygen environment (2,8.9,10,11).

Six patients with chronically infected traumatic wounds, were treated with aggressive debridement, extensor mechanism reconstruction and transposition of the gastrocnemius muscle for cover.

Follow up at two years showed active knee extension with normal gait, without recurrent infection.

Key Words: gastrocnemius, chronic infection, knee joint.

INTRODUCTION

Traumatic disruption of the knee joint is usually accompanied by extensive soft tissue injuries as well as fractures around the knee joint. In our series of six cases of traumatic chronically infected knee joint present a complex avulsion and chronic wounds of the knee joint are challenging to both orthopaedic and plastic surgeons, and require innovative cooperation (4).

The reconstructive options may be limited and the resultant defect produced by thorough debridement and the repeated lavage of the chronically infected knee wound produce defect of varying degree, where each component of the knee joint require restoration of form and function at the defect site.

Dr. Munir Alam
46 University Town, Millat Road, Faisalabad, Pakistan.
Ph: +92 321 7711360
E. Mail : mrmuniralam@gmail.com
Web: www.muniralam.com

Selection of a reconstructive option is based on the feasibility and relative importance of replacing each component of the defect. The exposed knee joint is a challenging problem that has most commonly dealt with using muscle flaps. Inability to accurately predict the amount of debridement required may necessitate sequential wound debridement with subsequent wound observation and the judicial use of antibiotics according to bacterial culture and sensitivity.

The gastrocnemius muscle flap is a well recognised method to provide soft tissue cover for this region and controls infection and promotes healing by increasing vascularity to the area (1,2,7,10). It can be raised far from the damaged area and tunnelled to avoid repeated undermining (9). However, success in cases of chronically infected knee joints is difficult to accomplish and depends on various measures such as debridement and lavage should be seriously taken into account before planning reconstruction of the infected knee joint.

Six cases with chronically infected knee joint are described, where such a procedure has yielded good results. 4

MATERIAL AND METHODS:

During fourteen years period from the year 2000 to 2013, total number of six patients treated for traumatic chronically infected knee joint with gastrocnemius muscle flap. Out of six patients, one patient knee wound reconstruction performed with a lateral gastrocnemius muscle flap along with a medial knee bipedicled saphenous venous flow through fasciocutaneous flap to cover the repaired quadriceps mechanism in the midline.

This study of six patients include five male and one female patient.

RESULTS:

The chronically traumatic infected knee wounds associated with bacterial contamination or established infection invariably presents difficulty in reconstructive surgery. Historically standard random pattern flaps provided inadequate resistance to infection. With the advent of the pedicled gastrocnemius muscle flap, however, regional transposition flaps became a feasible option for chronically infected traumatic infected knee joint wounds.

DISCUSSION

Traumatic loss of the extensor mechanism of the knee is usually due to direct injuries. This usually results in extensive devitalisation of soft tissue and contamination requiring complex wounds reconstruction. As a consequence, problem of reconstruction of the extensor mechanism and infection are frequently encountered (1).

The objective of treating open infected knee joint with loss of skin and disruption of the extensor mechanism are to ensure rapid healing and restore joint function. These can be achieved by provision of soft tissue cover, control of infection and reconstruction of the extensor mechanism once the wound heals.

One of the patient's injuries included communited compound fracture of the patella and damage to the medial condyle of the femur, she developed gross infection of the knee resulted in loss of patella and all of the extensor mechanisms. In addition, further dressings and 5 debridement on frequent interval produced a 8 X 9 cm large defect in the extensor mechanisms with complete loss of patella. After repeated debridement and thorough lavage of knee joint for 3 weeks, gastrocnemius flap incorporating both bellies along with an extension of the achilles tendon was used to reconstruct the extensor mechanism and to fill the gap in quadriceps mechanism as well as to cover the knee joint (Fig 1).

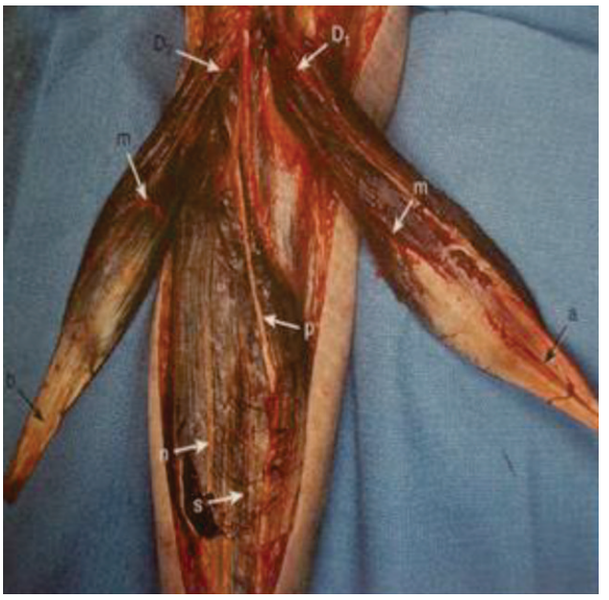


Fig 1: Medial and Lateral Gastrocnemius muscle flaps

It is well known that muscle is a vascular tissue, and the gastrocnemius muscle is especially suitable for the reconstruction of the infected knee joint, provided adequate debridement and thorough lavage is carried out before transposition of gastrocnemius muscle flap. In the lower extremity the gastrocnemius muscle is certainly the most reliable and versatile muscle to transpose (5,10,13). Gastrocnemius muscle flap is a type 1 and is divided into two parts, medial and lateral head which extends from knee joint to the heel.

Normal function of the gastrocnemius muscle is plantar flexion of the foot, either or both heads of the gastrocnemius are expandable if the solius muscle is kept intact. Each muscle head is considered as a separate unit with an approximate size 20 X 8 cm, containing separately its neurovascular bundle. The sural artery originate below the knee joint line. The estimated the location of the 6 origin of the sural artery from the popliteal artery to lie within 1 to 55 mm above the distal femur line. Other recent studies have suggested that the branches of the sural artery arise 2 to 4 cm above the knee joint line (13). It remains an easy flap to raise in a normal leg. Tissue planes are relatively clear, and the flap can be raised well outside of the zone of injury. (Fig 1, 2). With proximal arc of rotation of gastrocnemius muscle, transposition of the muscle head provide coverage of the defects of lower half thigh, knee, and upper third of the tibia (13) (Fig 3). Preoperative selection and planning of the flap does not usually require lower limb angiogram unless there is extensive crushing or penetrating traumatic injuries resulting in absent pulses, documented atherosclerotic peripheral vascular disease, or previous surgery that may have affected the vasculature of the planned flap (14). Complications related to this procedure are infrequent and are in most instances due to errors of the surgical technique (8) and recurrent infections, which is usually related to inadequate debridement of the infected and ischaemic tissue or incomplete obliteration of dead space (5).

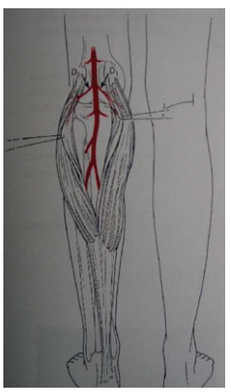


Fig 2: Pedicle – medial and lateral sural artery arising from the popliteal artery

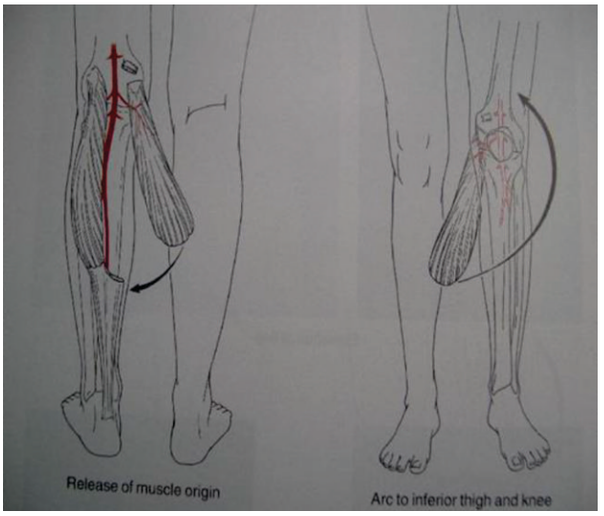


Fig 3 a: Arc of Rotation

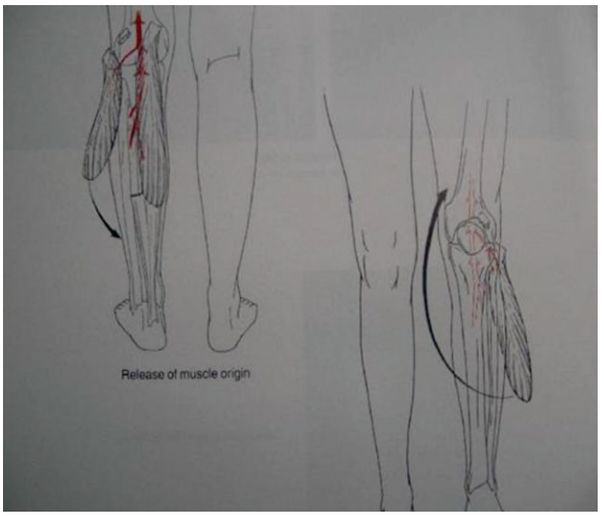


Fig 3 b: Arc of Rotation

In another patient with oval defect in extensor mechanism, the muscle was not bulky and hence it was comfortably positioned by relating it to lie obliquely across the defect. The advantages of using this procedure are that the continuity of origin with muscle which result in faster healing in a previously infected joint, and the muscle flap appears to provide the cellular, non-cellular and the oxygen environment necessary to deal with the site of infection (5,6). The problem of adhesions is minimised as the presenting surface is smooth and is covered by loose areolar tissue.

The mild extensor lag and slight limited flexion was probably due to adhesion formation in a chronically infected knee joint.
Stark in 1946 reported that, " The pedicled muscle flap is useful in the surgical treatment of chronic osteomyelitis in 84% of wounds treated with muscle flap coverage in conjuction with thorough bone debridement and antibiotic therapy as compared with 43% of patients treated without a muscle flap (15).
Ger in 1977 reported the successful use of the muscle transposition flap for treatment and prevention of chronic posttraumatic osteomyelitis of the tibia (16).

CONCLUSION

Traumatic chronically infected knee joint is a challenge for reconstructive surgeon, however, strict adherence to the basic principles of surgery, thorough debridement and lavage of infected and devitalised tissue, providing coverage of the defect with healthy vascularised muscle resulting in eliminating of chronic infection and near normal function of the knee joint.

REFERENCES

1. Leung K. S, Kevin M, Shen H. Y, (1994) Reconstruction of Extensor Mechanism after Trauma and infection by Transposition of the Achilles Tendon: Report of Technique and Four Cases, Journal of Orthopaedic Trauma, Vol. 8. No. 1, pp 40-44.
2. Philip G. A, and Mixter R. C, (1983) Making the most of the Gastrocnemius Muscles, Plast & Reconstr Surgery, Vol. 72, pp 38-48.
3. Babu N. V et al, (1994) Reconstruction of the quadriceps apparatus following open injuries to the knee joint using pedicled gastrocnemius musculotendinous unit as bridge graft, British Journal of Plastic Surgery, vol 47, pp, 190-193.
4. Asko-Saljavaara S, Haajanen J, (1982) The Exposed knee joint, The journal of Trauma, vol. 22, 1021-1025.
5. Feldman J. J, Cohen B. E, (1978) The medial gastrocnemius myocutaneous flap: Plast & Recostr Surg, pp 531-539.
6. Tellier M. A and Kon M, (1991) Gastrocnemius muscle transposition for bony and soft-tissue defects: The Netherlands Journal of Surgery, 43-1. pp 10-13.
7. Pico R, Luscher N. J, Rometsch M, De Roche R, (1991) Why the denervated Gastrocnemius Muscle Flap should be encouraged, Annals of Plastic Surgery, Vol 26 No 4, pp 312-324.
8. Whitney T. M, Heckler F. R, White M. J, (1995) Gastrocnemius Muscle Transposition to the femur: How high can you go? Annals of Plastic Surgery, vol. 34, pp 415-419.
9. Dibbell D. G, Edstrom L. E, (1980) The gastrocnemius myocutaneous flap: Clinics in Plastic Surgery, vol. 7, pp 45-50.
10. Casanova D et al, (2001) Management of Wounds of Exposed or Infected Knee Prosthesis, Scand J Plast Reconstr Hand Surg 35: pp 71-77.
11. Hersh C. K, Schenck R. C, and Williams R. P, (1995) The Versatility of the Gastrocnemius Muscle Flap, the American Journal of orthopaedics, pp. 218-222.
12. Isenberg J S, McPherson E, Costigan et al, (1999) Salvage and Reconstruction of Complex Post-Operative Knee Wounds: A successful surgical protocol, Journal of Reconstructive Microsurgery, Vol 15, No 2: pp115-118.
13. M Alam, C Lawlor, M O'Donnell, (2007) Versatility of gastrocnemius muscle flap, How high can you reach? Plast & Reconstr Surgery, Vol 120(7): pp 2129-2130,

14. Miguel A. Mendez-Fernandez, (1998) Failure of a Gastrocnemius Muscle Flap Due to an Isolated High-Grade Stenosis of the Sural Artery, Annals of Plast Surgery Vol 40, No 2: pp 186-188.
15. Stark W. J. (1946) The use of pedicled muscle flaps in the surgical treatment of chronic osteomyelitis resulting from compound fractures, J Bone Joint Surg Am, Vol 28 (2): 343 -350 .
16. Ger R. (1977) Muscle transposition for treatment and prevention of chronic post-traumatic osteomyelitis of the tibia, J Bone Joint Surg Am, jbjs.org

ORIGINAL ARTICLE

Low Risk Primary Augmentation Mammoplasty and Capsular Contracture using Textured Round Cohesive Silicone Gel implants Revisited. A Long Term Follow Up in a Single Surgeon's Practice.

Mr. Umar Daraz Khan

Abstract:

Background: Capsular contracture following augmentation mammoplasty is the most common complication requiring revision surgery. However there is a lack of single surgeon's long term follow up regarding this most common complication.

Methods: Retrospective data was retrieved using XL Spread Sheet, primary augmentation mammoplasty performed between May 1999 and August 2015 was reviewed. All patients had their surgery performed and followed up by a single surgeon. All patients had textured round cohesive gel silicone implants using inframammary incision with a minimum follow up of 1.5 years, were selected. Asymptomatic capsular contractures (Baker Grade I and II) were compared with symptomatic contractures (Grade III and IV) on the basis of the age of the patient, size of the implants and duration of implantation. Asymptomatic and symptomatic capsular contracture rate was also compared based on the position of the implants, smoking status of the patients and presence and absence of the drains.

Results: There were 117 patients with a mean follow up of 6.6 years (range 1.5-12) in the series. Mean age of the patients was 32.2 years (range 18-53) with a mean implant size of 336.2 cc (range 230-540). Of 117 patients, 107 (91.5%) were asymptomatic with a mean age of 31.9 years , mean implant size of 336 cc with a mean implantation of 6.7 years as compared to symptomatic capsular contracture present in 10 patients (8.5%) with a mean age of 35.3 years, mean implant size of 339cc and with a mean duration of 6 years. Of the 49 patients who had mammoplasty in subglandular pocket, 3 (6.1%) presented with Grade III or IV capsular contracture. Submuscular augmentation was performed in 68 patients, of these 7 (10.3%) presented with symptomatic capsular contracture. Smoking status was known in 114 patients. Of these 114, 25 were smokers and Grade III and IV capsular contracture was present in 2 patients (8.0%) as compared to 89 non smokers of whom 8 (9.0%) presented with Grade III-IV capsular contracture. Drains were used in 15 patients, of these 2 patients (13.3%) developed capsular contracture. Of the 102 patients who had their surgery without drains, 8 patients (7.8%) developed Grade III-IV capsular contracture. Of the 117 patients, 11 patients who had implants failures, 3 (27.3 %) presented with Grade III-IV capsular contracture as compared 6 (11.8%) of the 51 patients who did not have implant damage.

Conclusion: Incidence of capsular contracture in current long term series was 8.5%. There was no single cause identified for capsular contracture, including pocket of the implant placement, use of drains, smoking or implant rupture.

Mr. Umar Daraz Khan, FRCS
2-4 High Street, West Malling, ME19 6QR, Kent England
E-mail: mrumarkhan@aol.com
www. re-shape.co.uk
Home: 01634-686874 Mobile: 07966688893
Work 020-83114464 Fax: 01634-686219

Key words: *Augmentation mammoplasty, Capsular contracture, Biofilm, Revision mammoplasty.*

Introduction.

Breast augmentation is one of the most commonly performed aesthetic procedure performed today with a high satisfaction rate. However Capsular Contracture (CC) remains one of the leading cause for revision surgery.[1] Prevalence and causes of CC have been reported from time to time and vary from study to study. Incidence of Grade III/IV CC following primary augmentation mammoplasty using round Cohesive Gel implants may vary from 8.1% to 22% .[2-3] When Form stable Style 410 shaped implants are used, the rate of CC may vary from 1.9% at 3 year to 9.2% at 10 years.[4-5] Similarly Sientra round and shaped implants with High-Strength cohesive gel implants, 8 year follow up reported a CC rate of 11.2%.[6] An overall 8.2 % and 22% in a 15 year and 25 year follow up has been reported when different surgeons used various type of implants.[3,7] Collective data where more than one surgeon performed the surgeries may give a combine results of individual surgeons and figures may not represent individual surgeons outcome. A zero percent CC has been reported in a 3 year study when a single Surgeon performed all the surgeries.[8] However there is a paucity of long term rate of CC following augmentation mammoplasty by a single Surgeon using textured round cohesive gel silicone implants. Similarly there is a lack of information on the risk factors that may contribute towards the development of this most common complication and the leading reason for most revision surgeries following primary augmentation mammoplasty.

Patients and Method

Retrospective data using XL spread sheet was retrieved, primary augmentation mammoplasty performed between May 1999 and August 2015 was reviewed. All patients had their surgery performed and followed up by a single surgeon. All patients had textured round cohesive gel implants, using inframammary incision with a minimum follow up of 1.5 years, were selected. Asymptomatic capsular contractures (Baker Grade I and II) were compared with symptomatic contractures (Grade III and IV) on the basis of the age of the patient, size of the implants and duration of implantation. Asymptomatic and symptomatic capsular contracture rate was also compared based on the position of the implants, smoking status of the patients and presence and absence of the drains.

Technique.

All patients had their surgery performed by a single surgeon (author). All patients had their surgery under general anesthesia, in supine position, with their arms abducted <90 degree. All patients had inframammary incisions used for pocket access. Full muscle relaxation was achieved for patients who had their implants placed in submuscular pockets. A single dose of intravenous cephalosporin was given to all patients at induction time followed by an oral course for 5 days. Double gloves were used by the surgeon and outer gloves changed before handling the implants. Nipple shields are used routinely to minimize operative field from bacterial contamination of ductal origin. Implants were placed in subglandular and partial submuscular pocket during the early part of the series and all implants are now placed in muscle splitting biplane pocket. Pocket dissection is performed using monopolar large diathermy forceps on cutting mode under direct vision using lighted retrator. Full prospective hemostasis is achieved using monopolar cautery and pocket irrigated with normal saline at least four times. Drains were used in the earlier part of the review period. Before insertion of the implants, skin is cleansed with Povidone Iodine solution and to minimize implant and skin contact, Povidone Iodine solution soaked large swab is placed to cover the lower incised skin of the inframammary incision. Implants are dipped in Povidone

Iodine undiluted solution just before insertion through the inframammary crease incision. Once implants are inserted, implant pocket cavity is checked again for any bleeders freshenedup during insertion of textured implants. Incision is closed in layers and patients are discharged same day.

Statistical analysis.

The data were analysed using PASW version 18.0 software. The categorical variables are presented as frequencies and percentages, whereas the numeric variables are presented as mean ± standard deviation. Statistical analysis was performed differences in age, implant volume, and duration of implantation using the Student's t-test. Chi-Square test was used for comparison between capsular contraction group and its association with implant position, implant damage, presence of drain, and smoking status.

A p -value less than 0.05 was considered statistically significant for all the statistical tests.

Results:

There were 117 patients with a mean follow up of 6.6 years (range 1.5-12) in the series. Mean age of the patients was 32.2 years (range 18-53) with a mean implant size of 336.2 cc (range 230-540). Of 117 patients, 107 (91.5%) were asymptomatic (Grade I & II) with a mean age of 31.9 years (sd 9.1) , mean implant size of 336 cc (sd 51.4) with a mean implantation of 6.7 years (sd 3.0) as compared to symptomatic capsular contracture (Grade III &IV) present in 10 patients (8.5%) with a mean age of 35.3 years (sd 7.9), mean implant size of 339cc (sd 64.0) and with a mean duration of 6 years (sd 3.2). There was no statistical difference in all three parameters compared (p-value 0.25, 0.84 and 0.47 respectively).

Of the 49 patients who had mammoplasty in subglandular pocket, 3 (6.1%) presented with Grade III or IV capsular contracture. Submuscular augmentation was performed in 68 patients, of these 7 (10.3%) presented with symptomatic capsular contracture with no statistical difference between two groups (p-value 0.43).

Smoking status was known in 114 patients. Of these 114, 25 were smokers and Grade III and IV capsular contracture was present in 2 patients (8.0%) as compared to 89 non smokers of whom 8 (9.0%) presented with Grade III-IV capsular contracture. There was no statistical difference between the two groups (p-value 0.88).

Drains were used in 15 patients, of these 2 patients (13.3%) developed capsular contracture. Of the 102 patients who had their surgery without drains, 8 patients (7.8%) developed Grade III-IV capsular contracture. There was no statistical difference between the two groups (p-value 0.48).

Of the 117 patients, 11 patients who had implants failures, 3 (27.3 %) presented with Grade III-IV capsular contracture as compared 6 (11.8%) of the 51 patients who did not have implant damage. There was no statistical difference between the two groups (p-value 0.19).

A Kaplan-Meir 10 year analysis showed that 8.5% of the patients experienced capsular contracture. (Fig 1)

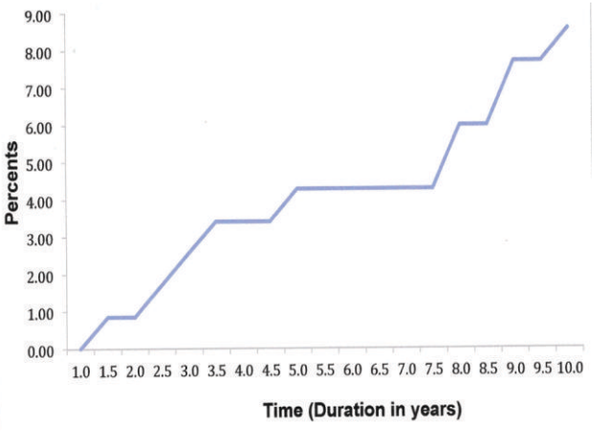


Fig 1. A 10- year Kaplan-Meier analysis of the risk of significant capsular contracture (Baker 3 or 4).

Discussion

Capsular contracture remains the most common overall indication for revision surgery following breast augmentation.[7] Capsule formation itself is a normal tissue response consisting of inflammatory cell response and deposition of fibroblasts and collagen fibers around a prosthesis.[9] This response is inevitable regardless the type of implant, pocket of the placement and the technique used. However the histology of the capsule may depend on the surface morphology of the implants. The smooth surface implants tends to have circumferential linear fibrosis associated with capsular contracture. Polyurethane and textured implants, as opposed to smooth surface implants, builds an irregularly arranged fibroblasts and collagen in the capsule. Textured surface in polyurethane foam or textured implants promote ingrowth of the tissue into the pores and the process disrupt the linear circumferential forces seen in smooth surface implant capsules.[10]The Velcro effect provided by textured implants do prevent mobility of the implant in the pocket.[10]Texturing of the implants may give some protection against the CC in some of the patients.[6,11]Similarly protection against CC has been reported by the use of Polyurethane Foam-Covered implants when compared with smooth or textured implants.[12]However at the end of 10 years, significant capsular contracture based on surface morphology was seen in 25% of polyurethane foam covered implants as compared with 35% when smooth or textured implants used.[7] Same study showed a small decrease in capsular contractures when textured implants were used as compared to smooth implants but the results were statistically insignificant.[7]Use of intraluminal antibiotics or corticosteroid therapy through indwelling catheter also has shown a significant decrease in primary CC following primary augmentation mammoplasties and also has reduced the recurrence of CC following the treatment of CC using capsulotomies.[9,13]

As opposed to popular belief, submuscular implant positioning, whether silicone or saline does not offer any significant protection.[3] This long term study based their results on the basis of location of implants regardless of the fill or texturing of implants. Earlier studies however have shown a significant reduction of grade III and Grade IV capsular contracture when implants were placed in submuscular pocket.[14]

Implant insertion with a funnel technique is gaining popularity and in a recently published article the procedure has shown to reduce the rate of capsular contracture form 1.49% to 0.68%. However the article has concentrated on rate of capsular contractures with and with out funnel technique and with out taking into account the other contributing cofactors or variables.[15,16]

Contributing factors leading to CC are many and include haematoma, foreign body, periprosthetic infection, biofilm and subclinical infection in the breast implant capsules. Role of smoking, use of drains, size of the implants, time since implantation and age of the patients are not very clear and there is a paucity of available information. A significantly higher rate of capsular contracture has been reported in patients who developed haematoma when compared to patients who did not develop haematoma.[3,7] However the study did not mention how the haematoma were treated. An untreated haematoma may raise the possibility of future development of capsular contracture as opposed to a treated haematoma using emergency exploration and evacuation of haematoma. In current series of 117 patients, there was no haematoma following augmentation mammoplasty. However, haematoma is always treated as an emergency by author and once treated in this way, the risk of developing capsular contracture was not observed more than the patients who did not

develop haematoma.

Periprosthetic infection following augmentation mammoplasty, whether treated surgically or conservatively, exponentially increases the risk of CC. The risk of Grade III and IV CC is higher with conservative nonsurgical treatment using antibiotic with a reported incidence of 76.9% as opposed to 28.6% CC when implants were explanted and replaced three months following wound healing.[17] In authors current series two patients developed periprosthetic infection, both were treated conservatively and both developed CC requiring revision surgery. However implants were salvagedin patients when author treated periprosthetic infection with antibiotic and following three repeated negative bacterial swabs, implants were explanted under general anesthetics. The implant pockets were then debrided and irrigated with dilute aqueous povidone iodine, normal saline and diluted hydrogen peroxide and the new implants were replaced in the same setting. Patients were continued on oral antibiotics for a week following intraoperative intravenous antibiotics. Breast implant pockets were drained for two days. There was zero % CC in this group of patients.[18]

Relationship between Biofilms, bacterial subclinical infection and CC is well documented. Virden et al were the first to publish the work showing association between CC and biofilm. Explanted prosthesis and capsules showed presence of biofilms on approximately 56% of the specimen when examined under Scanning Electron Microscope.[19] Normal swabs taken for bacterial culture from grade IV capsules and implants has a very low sensitivity for the growth of bacteria. However the process of sonication can greatly change the picture of these samples when prepared in this way. The process showed 89.5% positive bacterial cultures when grade III/IV capsules were prepared this way as opposed to 10.5% when Grade I/II capsules were analysed using sonication. Similarly implants removed from patients with Grade III/IV CC showed positive bacterial culture in 38.5% of the samples as opposed to 12.5% of the samples of implants with Grade I/II CC when specimen were prepared using sonication method.[20] Texturing of implants and the presence of the biofilm is not fully established and varying studies have suggested conflicting reports on the presence of biofilms on textured and non-textured implants.[1] However strong the association between biofilm and CC may be, it is interesting that not all implants with Grade III/IV CC have biofilms on SEM and similarly implants with biofilms in Grade I/II capsular contracture remain asymptomatic. It also interesting that not all Grade III/IV capsular or implant specimen, prepared using sonication method, grow positive bacterial culture or samples from Grade I/II capsule or implants showing a positive bacterial culture do not proceed to Grade III/IV capsular contracture.

The role of antibiotics when a revision surgery is performed in secondary surgery especially when complete capsulectomy is not performed is not fully understood.With 89.5% of bacterial presence in Grade III/IV and 10.5% in Grade I/II capsules, a higher incidence of clinical periprosthetic infection should be the norm, especially when 56% of the patient showed biofilm when capsules from Grade III/IV capsular contracture samples were analysed under SEM. Surprisingly a decreased rate of periprosthetic infection has been reported in revision augmentation mammoplasty surgery regardless of the degree of capsulation or the way these capsules were treated.[21]Are these bacteria virulent anymore or they have started living in symbiosis are the questions remains to be explored and investigated.

With so much uncertainties regarding established factors leading to the pathogenesis and development of Grade

III/IV CC requiring surgeries, it is almost imperative to look into other cofactors or causes that may possibly lead or contribute to the most common reason for revision surgery following augmentation mammoplasty. It is surprising to see that most of the leading articles on the subject lack information on the use of drains, age and smoking status of the patients, size of the implants, association of implant damage and duration since implant surgery.

The age of the patients who developed Grade III/IV CC was looked into and compared with the group which was associated nonclinical Grade I/II CC. Of the 117 patients 10 (8.5%) patients with a mean age 35.3 years developed Grade III/IV CC as compared to asymptomatic CC in 107 (91.4%) patients with a mean age of 31.9 years. Significant CC was seen in little older population but there was no statistical difference between the two groups (p=0.25). Table 1

Larger implants are expected to result in more stretch to the breast skin envelope, changing the Implant skin dynamics and interaction. The process may or may not contribute to the development of clinically significant CC and hence was analysed in the study. Of the 117 patients analysed, 10 (8.5) patients with a mean implant size of 339.5 cc developed Grade III/IV CC as compared to 107 (91.4%) patients with an implant size 335.9 cc who had grade I/II CC. There was no statistical significance between implant sizes of the two groups analysed (p=0.84) concluding no role of implant sizes on development of capsular contracture (table 1).

It also is a common belief that the longer the duration of implantation is, higher the chance of developing clinically significant CC. Again there is limited information available on this aspect. The duration of implantation in group with grade III/IV CC was analysed to see any different pattern of local response to duration of the implants. Of the 117 patients, 10 (8.5%) developed Grade III/IV CC. The mean duration of implantation was 6.0 years in this group of patients as opposed to 6.7 years in 107 (91.4%) patients who did not have clinically significant CC. Surprisingly Grade III/IV capsular was seen little earlier than the patient who were asymptomatic, however, when the results were analysed statistically there was no significant difference between the two groups (p=0.47). The results strongly put into question the common belief that capsular contracture is a time dependent process and longer the duration of implantation, more likely they are to develop capsular contracture (Table 1)

	Capsular Contracture groups	N	Mean	sd	P-value
Age in years	Baker Grade I-II	107	31.9	9.1	0.25
	Baker Grade III-IV	10	35.3	7.9	
Implant size	Baker Grade I-II	107	335.9	51.4	0.84
	Baker Grade III-IV	10	339.5	64.0	
Duration since implantation (years)	Baker Grade I-II	107	6.7	3.0	0.47
	Baker Grade III-IV	10	6.0	3.2	

Table. 1: Association of age, implant sizes and duration of implantation to development of Capsular Contracture.

In current series of the 117 patients, 8.5% developed grade III/IV CC. The submuscular subgroup (10.3%) had a higher incidence of clinical CC than subglandular group (6.1%) but without a statistical significance (p=0.43) (Table2)

Implant Position	Capsular Contracture Grade I/II	Capsular Contracture Grade II/IV	Total	P-value
Submuscular	61 (89.7%)	7 (10.3%)	68 (100%)	0.43
Subglandular	46 (93.9%)	3 (6.1%)	49 (100%)	
Total	107 (91.5%)	10 (8.5 %)	117 (100%)	

Table. 2. Association of Implant position to the development of Capsular Contracture.

Sub muscular pocket used were muscle splitting biplane and partial submuscular plane. The incidence of Grade III/IV CC was seen 4.2 % in muscle splitting biplane group as opposed 25% in partial submuscular subgroup. The statistical analysis between two submuscular pocket was not performed due to the smaller number of implants placed in partial submuscular pocket. Clearly Grade III & IV CC was markedlylower in muscle splitting biplane pocket.

A silicone cohesive gel implant rupture is usually asymptomatic and usually referred as silent rupture. However these implant failures, may initiate an inflammatory process that may potentially contribute towards symptomatic grade III/IV CC. Presence of implant damage and its association with the development of grade III/IV CC was analysed. Information on implant damage was available in 62 patients. Of the 62 patients, 11 had implant ruptured at the time of explantation. Of these 11 ruptures, 3 (27%) were associated with Grade III/IV CC. Of the 51 patients with no implant rupture, Grade III/IV CC was present in 6 (11%). The risk of significant CC is more than double when an implant is ruptured, however there was no statistical significance between the two groups when analysed (p=0.19) (Table 3).

Implant Damage	Capsular contracture I-II	Capsular contracture III-IV	Total	p-value
No	45 (88.2%)	6 (11.8%)	51 (100%)	0.19
Yes	8 (72.7%)	3 (27.3%)	11 (100%)	
Total	53 (85.5%)	9 (14.5%)	62 (100%)	

Table.3: Association of implant damage to the development of Capsular Contracture.

In current series all patient had textured implants so a comparison between smooth and textured implant was not possible to carry out.

Smoking has deleterious effects on wound healing and its association with infection is well known. There is a paucity of the effects of smoking, on the development of Grade III/IV CC. Smoking status of 114 patients was recorded in the sample analysed. Of the 114 patients, 25 patients were smokers and of these 2 (8%) developed CC. Of the 89 non-smokers, 8 (8.9%) patients developed Grade III/IV CC. There was no statistical difference between the two groups concluding no association between smoking and clinically symptomatic CC (Table 4)

Smoking status	Capsular Contracture I-II	Capsular contracture III-IV	Total	P-value
No	81 (91%)	8 (9%)	89 (100%)	0.88
Yes	23 (92%)	2 (8%)	25 (100%)	
Total	104 (91.2%)	10 (8.8%)	114(100%)	

Table.4: Association of smoking and development of Capsular Contracture.

In Augmentation mammoplasty, drains are not a substitute for meticulous haemostasis still drains are commonly used to minimise risk of haematoma and to prevent any residual blood collection following augmentation mammoplasty. A haematoma following augmentation mammoplasty has been shown to significantly increase the risk of CC and its association has been reported in long term studies. [3,7] However the use of drains in patient developing haematoma or whether haematoma was treated conservatively or surgically was not documented in the articles.[3,7] There was no haematoma in 117 patients analysed in the current series therefore association of haematoma with capsular contracture, whether treated or not, cannot be assessed. However drains were

used in 15 (13.3%) out of 117 patients. Of these 15 patients, 2 (13.3%) developed Grade III/IV CC. On the contrary 102 (87.17%) surgeries were performed without using drains. Of these 102 patients only 8 (7.8%) developed grade III/IV CC. Interestingly the use of drain to keep inside free of blood or to prevent collection of blood did not offer any reduced incidence of Grade III/IV CC. On the contrary the incidence of symptomatic clinical CC was seen in almost twice as many patients when drains were used. However the difference between the two groups was not significant when statistically analysed (p=0.48) (Table 5).

Drain	Capsular contracture I-II	Capsular Contracture III-V	Total	P-value
No	94 (92.2%)	8 (7.8%)	102 (100%)	0.48
yes	13 (86.7%)	2 (13.3%)	15 (100%)	
	107 (91.5%)	10 (8.5%)	117 (100%)	

Table. 5: Association of use of drain to development of Capsular Contracture.

Capsular tissue is a useful material and can be used in secondary or revisionary surgeries. An excellent overview of the use of the capsules is reported by Persichettie et al.[22] But the use of capsular flaps or capsular tissue is mostly limited to Grade I/II capsules. Advanced capsular thickening in Grade III/IV generally requires capsulectomy disallowing the use of this tissue in most of the cases. In current series, patients presenting with CC were treated with capsulotomies, partial or complete unilateral or bilateral capsulectomies, depending on the presentation
(Fig 2-5).

Fig.2 (a-c.) Preoperartive views of a 36 year old patient with a history of 465cc high profile cohesive gel round subglandular implants who presented with bilateral capsular contracture III. Her preoperative cup size was 34G. She was interested in CC treatment, downsizing her implants and breast cup size.

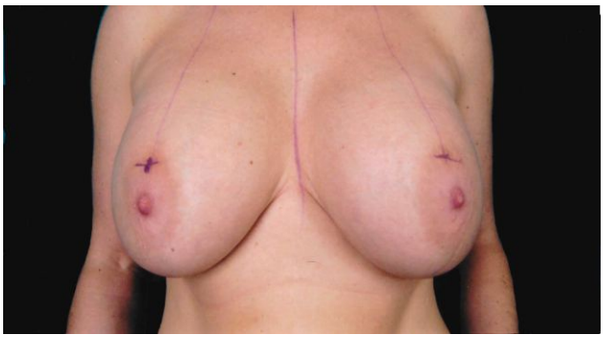


Fig. 2a

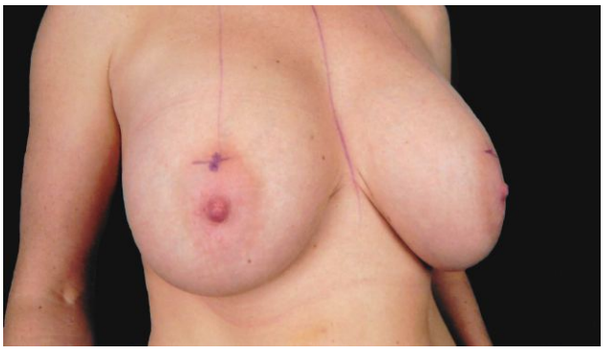


Fig. 2b

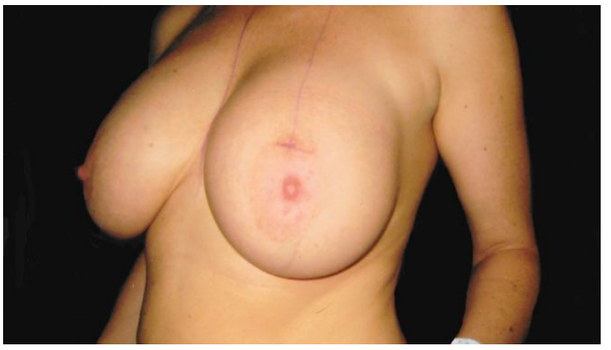


Fig. 2c

fig.2 (d-e.) Explanted implants along with the capsule. Change in the shape and size of the implants due to tight encapsulation can be noticed.

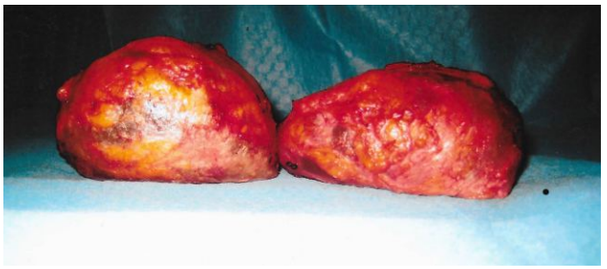


Fig. 2d

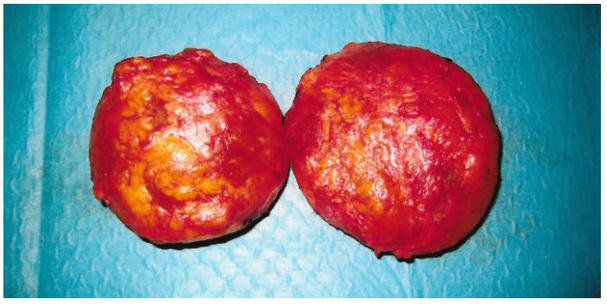


Fig. 2e

Fig. 2. f-h Postoperative views following mastopexy with 330cc moderate profile cohesive gel silicone round textured implants placed in muscle splitting biplane pocket. Excised skin and tissue weighed 80 and 82 from her right and left breast respectively. Her postoperative cup size was 34D.

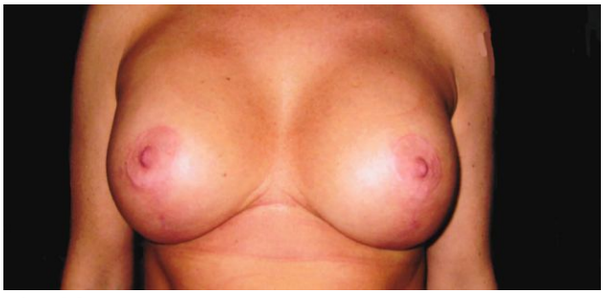


Fig. 2f

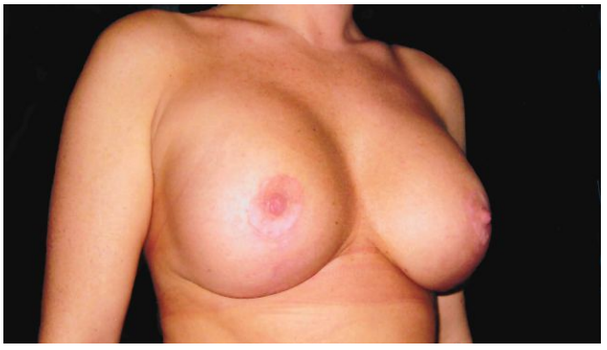


Fig. 2g

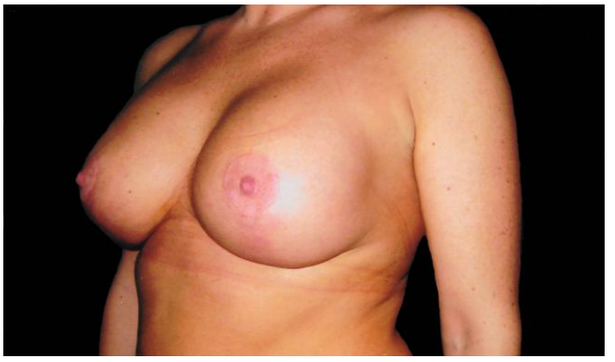


Fig. 2h

Fig. 3. a-c. Preoperative views of a 30 year old patient who had augmentation mammoplasty 11 years ago and presented with bilateral CC. She had 310cc high profile silicone cohesive gel implants in subglandular pocket with a breast cup size of 32D. She requested for smaller breast and nipple areolar complex size (NAC).

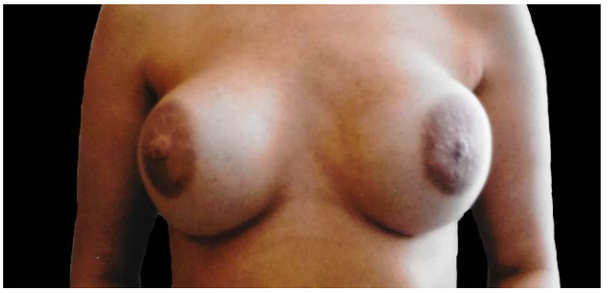


Fig. 3a

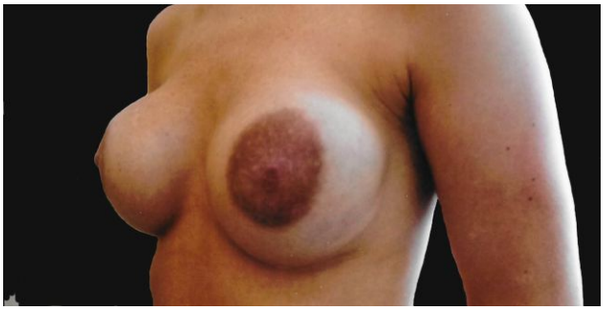


Fig. 3b

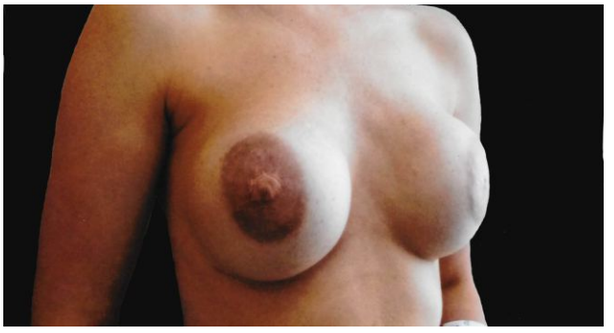


Fig. 3c

Fig. 3. d. Both explanted prosthesis with near total capsulectomy

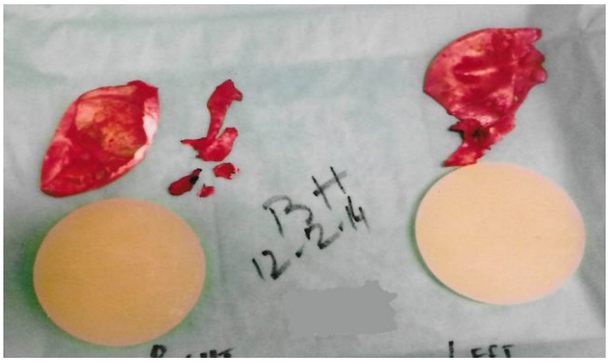


Fig. 3d

Fig. 3. e-g. Three months postoperative views following 260cc round moderate profile cohesive gel silicone round textured implants. Implant pocket was changed from subglandular to muscle splitting biplane, NAC size was reduced to 4.2cm using circumareolar excision and her post breast cup size was changed to 32C.

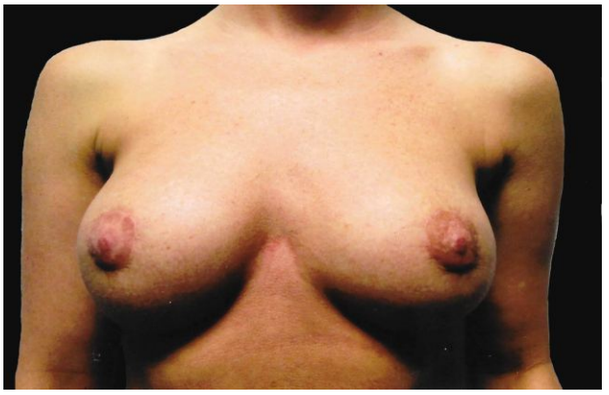


Fig. 3e

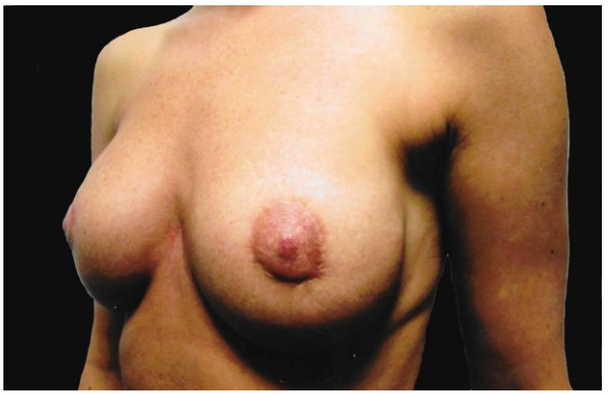


Fig. 3f

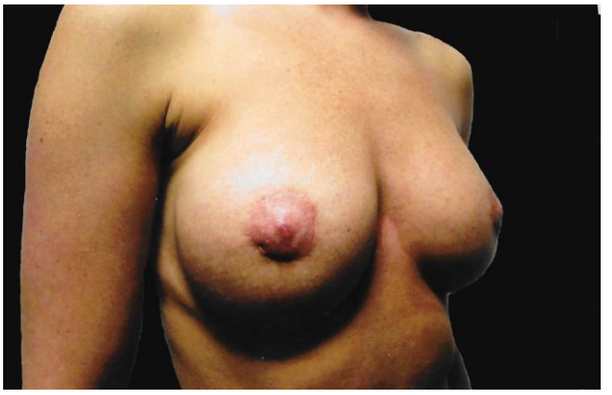


Fig. 3g

Fig. 4. a-c. Preoperative pictures of a 42 year old female presenting with grade IV CC. She had her augmentation mammoplasty 8 years ago with 290 cc high profile silicone cohesive gel silicone round texture implants, placed in subglandular pocket.

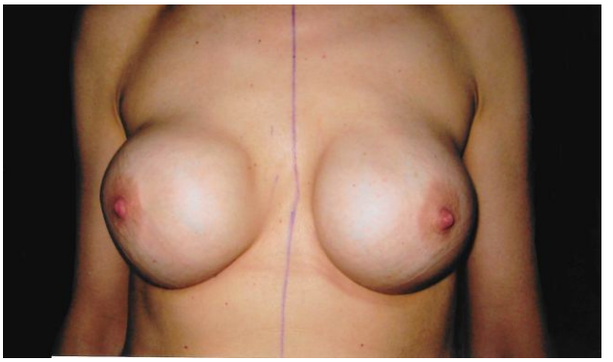


Fig. 4a

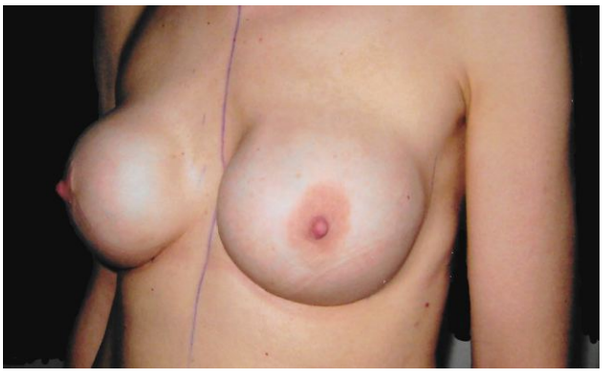


Fig. 4b

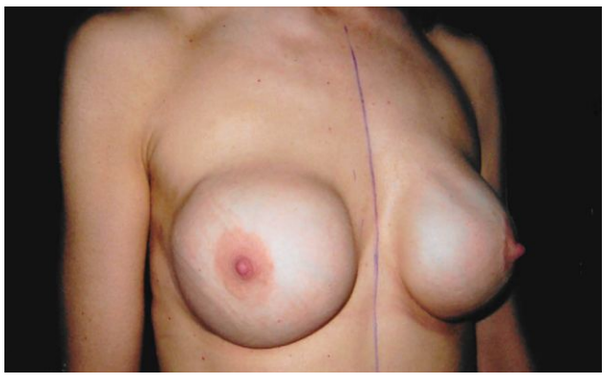


Fig. 4c

Fig. 4. d. Undamaged explanted prosthesis with complete capsulectomies.

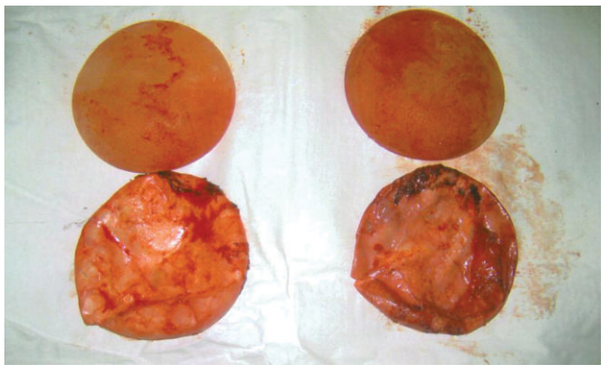


Fig. 4d

Fig. 4. e-g. Postoperative pictures taken 4 months following surgery. She had 380 cc silicone cohesive gel round textured implants. Her implant pocket was changed from subglandular to muscle splitting biplane

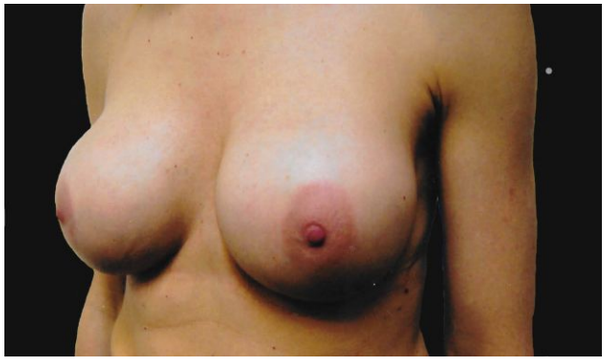


Fig. 4e

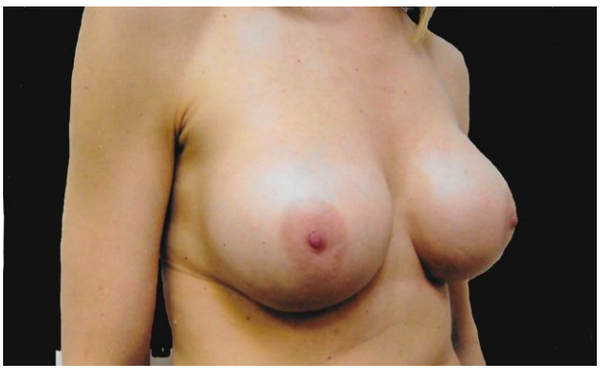


Fig. 4f

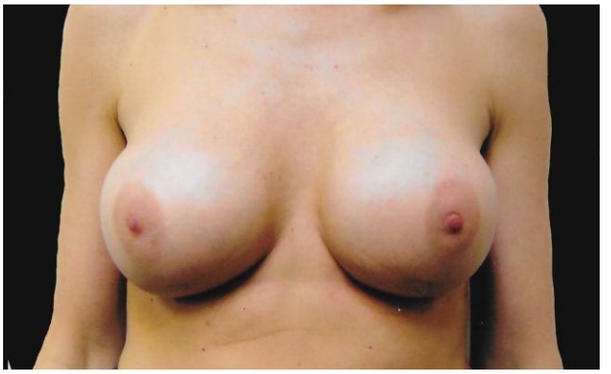


Fig. 4g

Fig. 5. a-c. A 40 year old patient who presented with Grade III/IV CC. She had augmentation mammoplasty 8 years ago. She had 300cc cohesive gel silicone round textured implants in muscle splitting biplane.

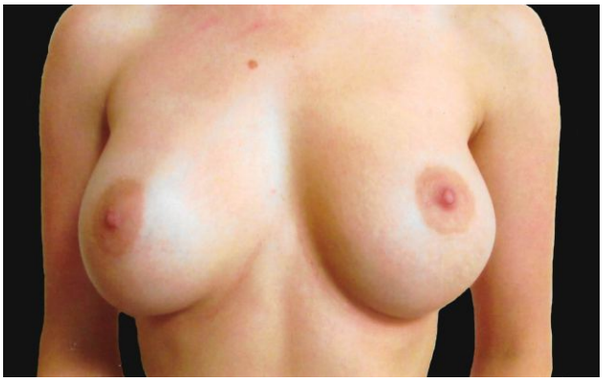


Fig. 5a

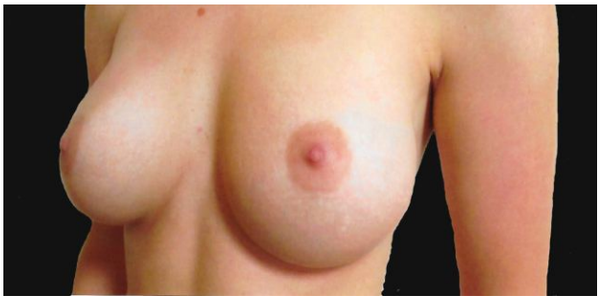


Fig. 5b

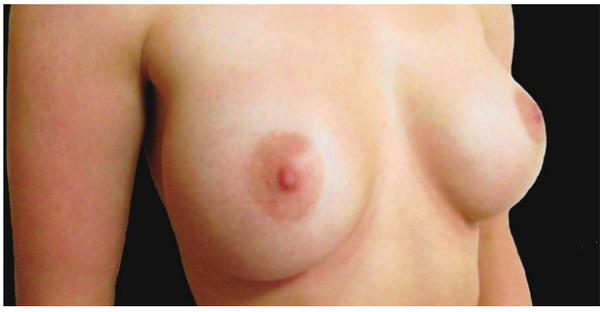


Fig. 5c

Fig. 5. d-f. Postoperative pictures taken four months following capsulotomies. She had 375cc round cohesive gel silicone texture implants placed without pocket change.

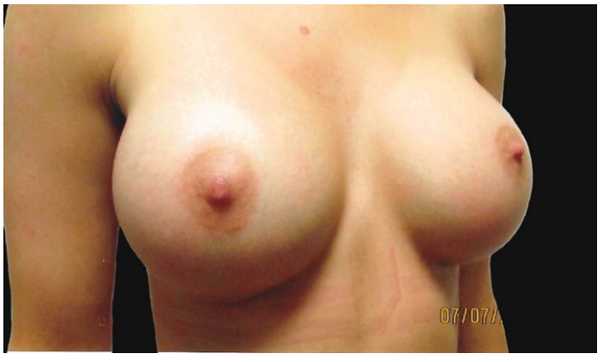


Fig. 5f

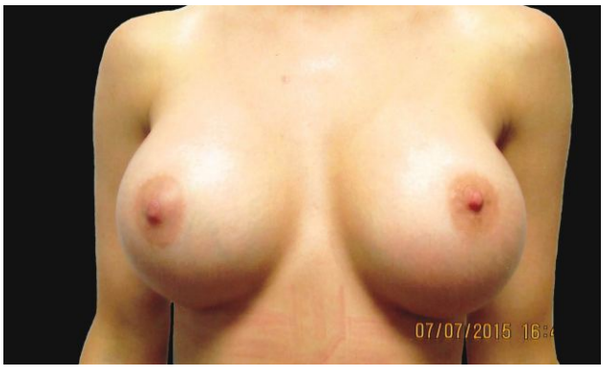


Fig. 5d

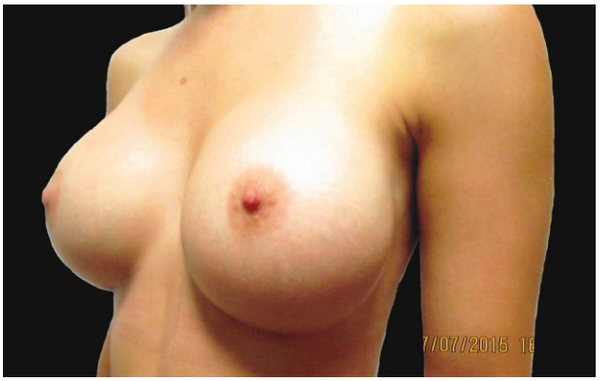


Fig. 5e

Grade III/IV CC recurrence is reported higher in revision surgeries treated for clinically advanced CC.[17] Use of Dual plane has been described for the correction of CC following mammoplasty in sub glandular pocket to reduce CC recurrence. [23] In the current series implant pockets were routinely changed to muscle splitting biplane pocket when CC developed following sub glandular or partial submuscular mammoplasty.[21,24-25] The purpose is twofold, firstly, the audit of the current series has shown that occurrence of grade III/IV CC was least common in muscle splitting biplane and secondly by changing the pocket for the replacement of new implants, the risk of recurrence can be reduced. Intraluminal antibiotics also has been used to reduce the recurrence capsular contracture following the treatment of capsular contracture using capsulotomies.[13] Use of corticosteroids through indwelling suction catheter has been reported to decrease the recurrence of Grade III/IV capsular contracture following capsulectomies and replacement of implants.[9]

The overall CC, in the current series of primary augmentation mammoplasties, with a mean follow up period of 6.6 years (Range 1.5-12) is 8.5 %. In the series, all surgeries were performed and followed up by the same surgeon. In another published study, zero% CC was reported when single surgeon did all

the surgeries and followed up all the patients for three years.[8] The Danish national prospective study showed a Grade III/IV CC rate of 1.3% with a maximum follow up for four years.[26] The 8.5% Grade III/IV CC rate in a single surgeon series is lot lower than the 22% found in 25 year study.[7]

With an expected 10-15% chance of 5th generation implant rupture at 10 years and an expected 8.5% rate of CC with a mean duration of 6.5 years, it is expected that about 15 to 20% of the patients will require an unplanned surgery within 10 years following their primary augmentation mammoplasty.

Limitations of the study.

Long term studies and data collection is not without its limitations. Author has performed over 2,400 primary augmentation mammoplasties and only 117 patients had a record of 1.5 years or more on the status of the degree of Capsular Contracture. Vast majority of the patients were not followed up longer than 1.5 years. However all the patients were followed up and examined by the author and thus have uniformity in the assessment of the degree of Capsular Contracture.

Conclusion

The development of Capsular contracture remains a challenging subject as ever. The current single surgeon study does show an acceptable and comparable rate of capsular contractrure when followed up to 12 years. There was no specific factor identified in this study for the development of capsular contracture.

For This type of retrospective study formal consent is not required.

ACKNOWLEDGMENT

The authors declare that they have no conflicts of interest to disclose.

References

1. Adjic D, Zoghbi Y, Gerth D, Panthaki ZJ, Thaller S. The Relationship of Bacterial Biofilms and Capsular Contracture in Breast Implants. Aesthetic Plast Surg,2016;36:297-309
2. Cunningham B. The Mentor Core Study on Silicone Memory Gel Breast Implants. Plast. Reconstr. Surg. 2007;120(7 Suppl 1):19S-Pl29S
3. Codner MA, Mejia JD, Locke MB, Mahoney A, Thiels C, Nahai FR, Hester TR, Nahai F. A 15-Year Experience with Primary Breast Augmentation.Plast. Reconstr. Surg 2011;127:1300-1314
4. Bengston BP, Van Natta BW, Murphy DK, Slicton A, Maxwell GP; for the Style 410 U.S Core Clinical Study Group. Style 410 Highly Cohesive Silicone Breast Implant Core Study Results at 3 Years. Plast. Reconstr. Surg. 2007;120(7 Abstract Suppl !):40S-48S
5. Maxwell GP, Van Natta BW, Bengston BP, Murphy DK. Ten-Year Results From Natrelle 410 Anatomical Form-Stable Silicone Breast Implant Core Study. Aesthetic Plast Surg.2013;35:145-155
6. Stevens WG, Harrington J, Alizadeh K, Broadway D, Zeidler K, Godinez TB. Eight-Year Follow-Up Data from the U.S. Clinical Trial for Sientra's FDA-Approved Round and Shaped Implants with High-Strength Cohesive Silicone Gel. Aesthetic Plast Surg.2015;35(S1);S3-S10
7. Handel N, Cordray T, Gutierrez J, Jensen JA. A Long-Term Study of Outcomes, Complications, and Pateint Satisfaction with Breast Implants.Plast. Reconstr. Surg.2006;1177:757-767
8. Tebbet JB. Achieving a Zero Percent Reoperation Rate at 3 Years in a 50-Consecutive-Case Augmentation Mammoplasty Premarket Approval Study. Plast. Reconstr. Surg.2005;118:1453–7
9. Costagliola M, Atiyeh BS, Rampillon F. An Innovative Procedure for the

treatment of Primary and Recurrent Capsular Contracture (CC) Following Breast Augmentation. Aesthetic Plast Surg.2013;33:1008-1017
10. Barone FE, Perry L, Keller T, Maxwell GP. The Biomechanical and Histopathologic Effects of Surface Texturing with Silicone and Polyurethane in Tissue Implantation and Expansion. Plast. Reconstr. Surg.1992;90:77-86
11. Maxwell GP, Scheflan M, Spear S, Nave BM, Haden P. Benefit and Limitation of Macrotextured Breast Implants and Consensus Recommendations for Optimising Their Effectiveness. Aesthetic Plast Surg.2014;34:876-881
12. Neal Handel. Long-Term Safety and Efficacy of Polyurethane Foam-covered Breast Implants. Aesthetic Plast Surg.2006;26:265-274
13. Burkhardt BR, Fried M, Schnur PL, Tofield JJ. Capsules, Infection, and Intraluminal Antibiotics. Plast. Reconst. Surg.1981. 81;68:43-49
14. Biggs TM, Yarish RS. Augmentation Mammoplasty: A comparative Analysis. Plast. Reconst. Surg.1989;85:368-372
15. Flugstad NA, Pozner jn, Baxter RA, Creasman C, Egrari S, Martin S, Messa III CA, Oliva A, Schlesinger L, Kortesis BG. Does Implant Insertion with a Funnel Decrease Capsular Contracture? A preliminary Report. Aesthetic Surg J 2014;36:550-556
16 Deva AK, Commentaryon: Does Implant Insertion with a Funnel Decrease Capsular Contracture? A preliminary Report. Aesthetic Surg J 2014;36:557-558
17. Courtiss EH, Golgwyn RM, Anastasi GW. The Fate of Breast Implants with Infections Around them.Plast Reconstr Surg.1979;63:812-16
18. Khan UD. Breast Augmentation, Antibiotic Prophylaxis and Infection: Comparative Analysis of 1628 Primary Augmentation Mammoplasties to Assess the Role and Efficacy of Length of Antibiotic Prophylaxis. Aesth Plast Surg.2010; 34:42-47.
19. Virden CP, Dobke MK, Stein P, Parsons CL, Frank DH. Sibclinical infection of the silicone breast implant surface as a possible cause of capsular contracture. Aesthete Plast Surg.1992;16:173-179
20. Pajkos A, DevaAK, Vickery K, Cope C, Chang L,Cossart YE. Detection of subclinical infection in significant b. reast implant capsules. Plast Reconstr Surg. 2003:111:1605-1611
21. Khan UD. Secondary Augmentation Mammoplasties and Periprosthetic Infection. A Three Year Retrospective Review of 92 Secondary Mammoplasties Performed by a Single Surgeon. Aesthetic Surg J.2012; 32:465-473
22. Persichetti P, Segreto F, PendolinoAL, Buono RD, Marangi GF. Breast Capsule Flaps and Grafts: A Review of the Literature.2014;38:540-548
23. Spear SL, Carter ME, Ganz JC. The Correction of Capsular Contracture by Conversion to "Dual-Plane" Positioning: Technique and Outcomes. Plast. Reconstr Surg. 2002;12:456-467
24. Khan UD. High Transverse Capsuloplasty for the Correction of Malpositioned Implants Following Augmentation Mammoplasty in Partial Submuscular Plane. Aesth Plast Surg.2012; 36:590-599
25. Khan UD. Subglandular to Muscle Splitting Biplane Conversion for Revision Augmentation Mammoplasty. In: Mugea TT, Schifmann MA, editors. Aesthetic Surgery of the Breast. 1st ed. Berlin: Springer; 2015. p. 535-41.
26. Henriksen TF, FryzekJP, HolmichLR, McLoughlin JK, Kjo;;erK, Hoyer AP, Olsen JH,Friis S. Surgical Intervention and Capsular Contracture After Breast Augmentation. A prospective Study and of Risk Factors. Annals od Plastic Surger. 2005;54:343-351

ORIGINAL ARTICLE

Intra-neural ganglions of the ulnar nerve: Case report and review of the literature

Mr. Shenbana Bagirathan, Mr. Heidi Jones, Mr. Muhammad Riaz

Summary

We report the case of a middle-aged, male, electrician with a prolonged history of left hand ulnar nerve sensory-motor deficit, intrinsic muscle atrophy, clawing and palpable swelling to his left wrist.This was confirmed as an intraneural ganglion of the ulnar nerve on ultrasonography and magnetic resonance imaging.

Our literature review highlights that intraneural ganglions of the ulnar nerve can occur more frequently than once thought, particularly in middle-aged men, who may or may not have a previous history of local or regional trauma. The duration of symptoms is a predictor of the likelihood of recovery. Surgical excision remains the mainstay of treatment and is usually curative, but must be performed as soon as possible if the patient is to achieve resolution of their symptoms. The longer it is left, the longer the course of recovery. We recommend that clinicians have a high index of suspicion of intraneural ganglions when faced with progressiveulnar nerve compression neuropathy and/or a palpable swelling along the course of the nerve.

Key Words: *ulnar nerve, ganglion.*

Introduction

Ganglions are benign mucinous cysts commonly associated with joint capsules, tendons and tendon sheaths. Intraneural ganglions are those found within the epineurium of a peripheral nerve[1,2].The first case was reported in 1901 and has since frequently been described as occurring in the peroneal nerve at the fibular neck region[1,2]. In the upper limb, they most commonly occur in the ulnar nerve[3,4] and are not as rare as once thought. We report the case of an ulnar nerve ganglion arising in Guyon's canal and review the literature surrounding these benign lesions, which can cause profound functional disturbance in the individual if left untreated.

Mr. Shenbana Bagirathan
Plastic Surgery Registrar
Department of Plastic Surgery, Hull & East Yorkshire Hospitals NHS Trust Castle Road, Cottingham HU16 5JQ, United Kingdom

We present a case report to describe common presentations and the management of these ganglions.

Case Report

A 61-year old, male, right hand dominant electrician presented with a one-year history of left hand weakness, and three-year history of left hand pain and numbness. He had a five-month history of a swelling to his left wrist volar surface. He also had a history of a left hand injury twelve years previously which resulted in an ulnar nerve injury that spontaneously resolved. On examination, he had clawing of his left hand, severe atrophy of the interossei and hypothenar eminence, and reduced extension of the ring and little fingers. He had paraesthesia of the little finger volar surface and there was a palpable, fluctuant swelling on the ulnar-volar aspect of his wrist. An ultrasound scan revealed a mass suggestive of a large ganglion, 3.2 x 1 x 2.1cm, involving the deep motor branch of the ulnar nerve which was confirmed by MRIlocated in Guyon's canal*(figures 1 & 2)*.

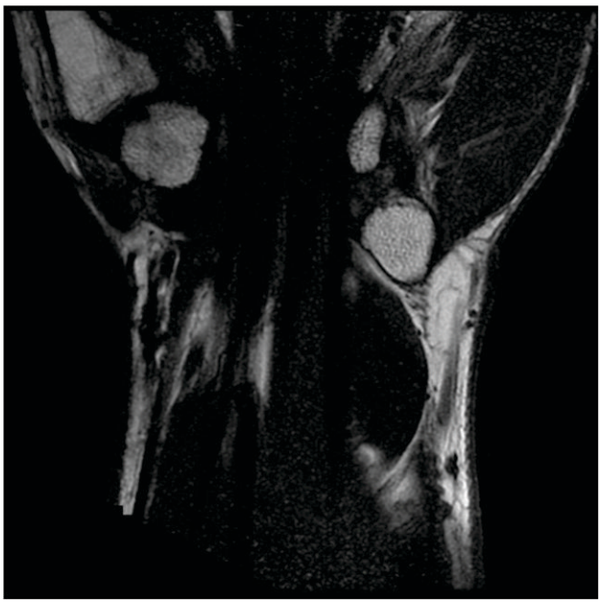


Figure 1. *T1-weighted magnetic resonance image of patient's ganglion within Guyon's canal*

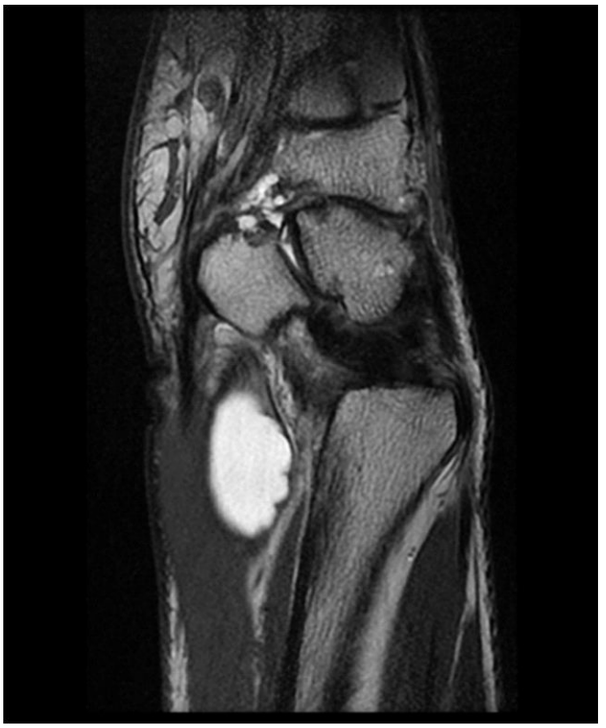


Figure 2. *T2-weighted magnetic resonance image of patient's ganglion within Guyon's canal*

Nerve conduction studies showed a distal ulnar nerve lesion only causing denervation of the small muscles of the left hand, and excluded peripheral neuropathy.

The patient underwent an urgent intraneural dissection and excision of the ganglion from his left wrist ulnar nerve. Intra-operatively, a volar-ulnar incision was made and a densely adherent intra-neural ganglion was identified within the epineurium of the ulnar nerve in Guyon's canal *(figures 3-5)*.

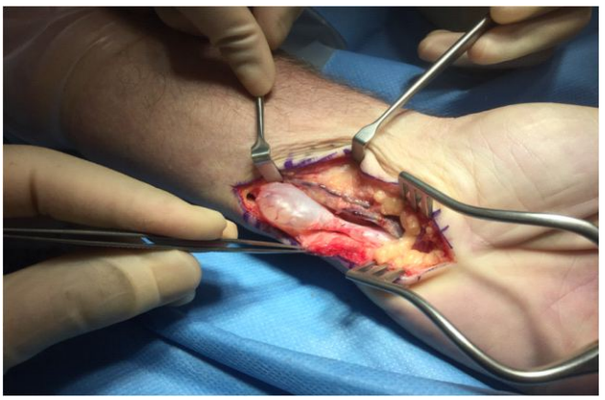


Figure 3.*Intraneural ganglion within left wrist Guyon's canal*

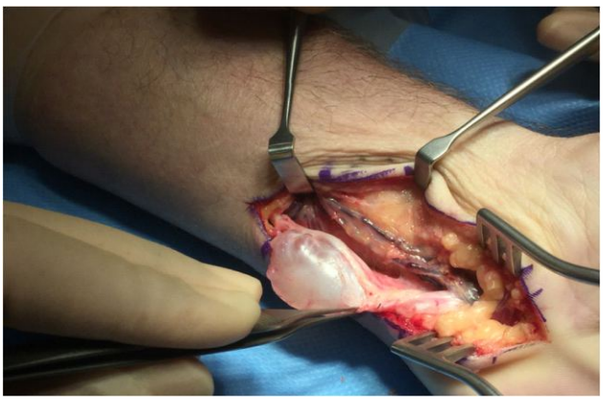


Figure 4.*Ulnar nerve epineural ganglion within Guyon's canal*

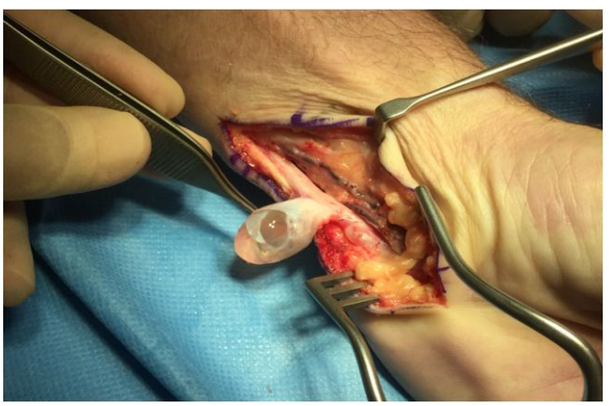


Figure 5.*Densely adherent ulnar nerve epineural ganglion*

The ganglion measured 5cm in length *(figure 6)* and the ulnar nerve was flat and inflamed*(figure 7)*.

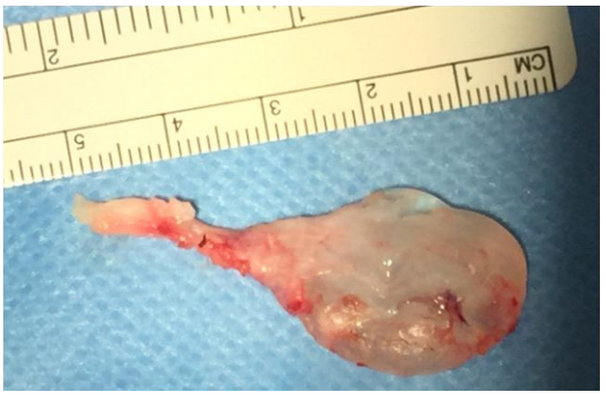


Figure 6.*Intraneural ganglion following excision from left ulnar nerve, measuring 5cm in length*

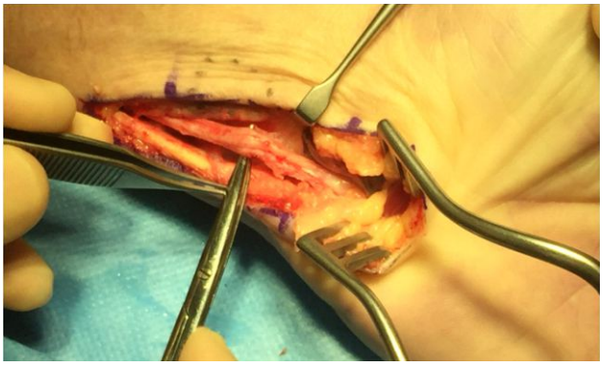


Figure 7.*Flat and inflammed left ulnar nerve within Guyon's canal, following excision of ganglion*

Histological diagnosis confirmed a benign ganglion. At three-month post-operative follow-up, he continued to have weakness in his left hand with persistent small muscle atrophy*(figures 8-10)*.

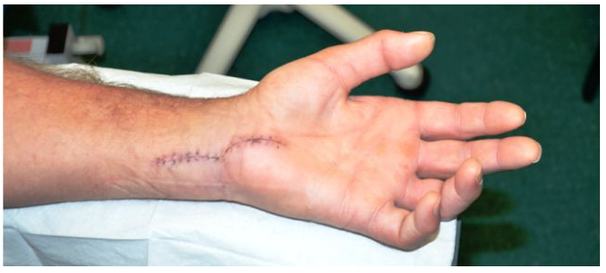
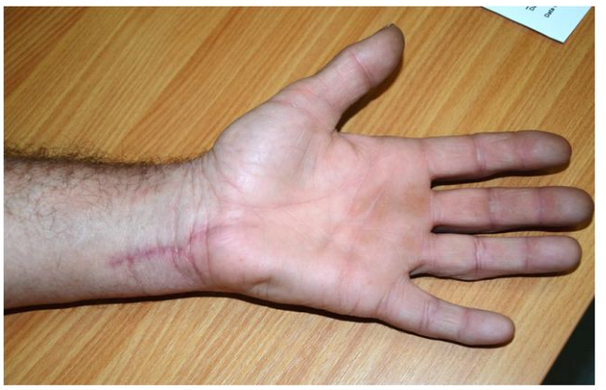


Figure 8. *Hypothenar wasting & clawing of left hand at 1-week post-op*
Figure 9. *Continued hypothenar wasting at 3-month follow-up*



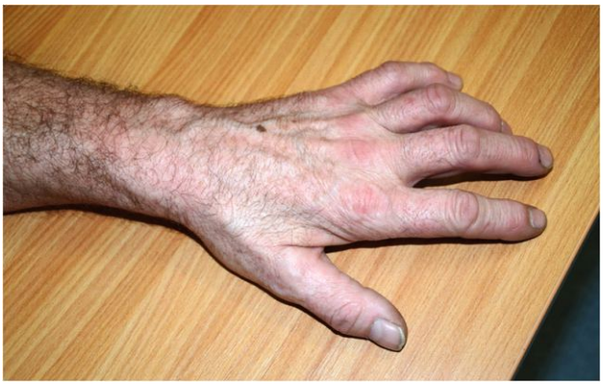


Figure 10. *Intrinsic muscle atrophy of left hand at 3-month follow-up*

However there was no evidence of ganglion recurrence.

Discussion

Intraneural ganglions were previously reported as rare and occurring more frequently in the common peroneal nerve, however following a review of the literature we believe these cases are more common than expected in the upper limb, often affecting the ulnar nerve. Kato et al describe a series of 38 patients with ulnar nerve compression at the elbow, 8% were secondary to ganglia, all originating from the ulno-humeral joint capsule[6]. Wang et al went on to report 60 cases of intraneural ganglions of the ulnar nerve, of which 22 were at the level of the wrist, and 3 had joint connections[5]. Naam et al reviewed 15 patients with intraneural ganglia of the hand and wrist, of which almost half were involved in the ulnar nerve at the wrist or the dorsal branch of the nerve[4].

Allieu et al state that intraneural ganglia most commonly affect middle-aged men, particularly those with a history of trauma[6]. Our patient was within this group of patients, however was unable to recall the exact mechanism of his previous injury. We identified seven case reports of ulnar nerve intraneural ganglion at the elbow or wrist, five male and two females; five patients between the age of 40 to 51 (age range 25-73, mean 46.4 years old). Of these, four patients had previous trauma, either locally or regionally. Naam et al also reported a mean age of 42 years old in their case series of intraneural ganglions of the hand and wrist[4]. Our patient presented with classical symptoms and signs of compression neuropathy of the ulnar nerve. This is in keeping with all the cases of ulnar nerve intraneural ganglion regardless of proximal or distal lesions, however not all cases presented with a palpable localisedswelling. Therefore those patients presenting with compression neuropathy at the elbow were often mistaken as a simple cubital tunnel syndrome.

Intraneural ganglions remain poorly understood, however two theories exist around their pathogenesis. Historically, they were thought to be the result of repetitive microtrauma causing mucoid degeneration of fibrotic tissue[3,7]. More recently, Spinner et al suggest that a joint connection into the peripheral nerve exists via an articular branch in all intraneural ganglions[8,9]. The significance of the latter relates to the method of surgical excision, which we will discuss later in this review article. Investigation tools are particularly useful in patients where a mass is not palpable and no clear diagnosis has been reached. These include electrophysiological studies, ultrasonography and magnetic resonance imaging (MRI). MRI allows for demonstration of the cystic nature of the mass, anatomical location and its extension, beneficial for pre-operative surgical planning. Typically they appear as a juxtaneuraluniformal cystic lesion, often multi-locular that are hypointense on T1-weighted images *(figure 1)* and hyperintense on T2-weighted magnetic resonance images[,10] *(figure 2)*. Spinney et al described several consistent features on MRI, which characterised intraneural ganglions and include a relatively narrowed neck (tail sign), tubular appearance because of its confines within the nerve, balloon-like expansion (balloon sign) wherein fascicles are displaced by the cyst (signet ring sign)[8-10.]

Benign and malignant tumours, such as malignant peripheral nerve sheath tumours, must be distinguished. It is important to consider the latter as a differential diagnosis in patients presenting with upper limb peripheral neuropathy. Mobbs et al described that two or more of the features on MRI were 90% specific for a malignant diagnosis which include large size, indistinct margins, abnormalities in adjacent soft tissue, peripheral enhancement pattern, lack of contiguity with adjacent nerves[7].

However, these features may not always be present, and may only be diagnosed intra-operatively[5].

The mainstay of treatment in all cases has been surgical excision of the ganglion, which may be performed in one of three ways. We performed dissection of the ulnar nerve and intraneural excision of the ganglion, as described by Naam et al[4]. However, the unifying articular theory of intraneural ganglions infers that for successful elimination, the articular branch must be excised and the ganglion itself can be simply drained or decompressed. In our case, careful exploration of the nerve and ganglion were performed but no intra-articular branch was identified. In a select number of cases, it may be necessary to excise the ganglion and ulnar nerve, for which nerve grafting may be required. In these cases it is important to discuss beforehand with the patient, as well as counsel him/her to the possibility of limited

recovery of normal limb function. Naam et al reported than neither of these three methods of surgical treatment had complications or recurrence; symptoms improved in all patients and all patients returned to normal activities at a mean ten days[4]. In fact, patients with a prolonged duration of symptoms had a slower return to normal function and persistent residual symptoms, secondary to stretching of the nerve[1,3]. At three months, our patient continues to have left hand weakness and small muscle atrophy, which may be consequential to his prolonged symptoms and size of the ganglion. We plan to continue his follow-up every six-months.

Conclusion

The intraneural ganglions of the ulnar nerve are not as rare as previously described. We recommend clinicians to have a high index of suspicion and to include intraneural ganglions in their differential diagnosis when a patient presents with signs of ulnar nerve compression and/or a swelling anywhere along the course of their ulnar nerve. The surgical excision tends to be curative and the mainstay of treatment.

References

1. Sinha S, Pinder RM, Majumder S. The largest reported epineural ganglion of the ulnar nerve causing cubital tunnel syndrome: Case report and review of the literature. *J PlastReconstrAesthetSurg*2013;**66**(1):e23-5.
2. Chen WA, Barnwell JC, Li Y, Smith BP, Li Z. An ulnar intraneural ganglion arising from the pisotriquetral joint: case report. *J Hand Surg Am* 2011;**36**(1):65-7
3. Wang H, Terrill RQ, Tanaka S, Amrami KK, Spinner RJ. Adherence of intraneural ganglia of the upper extremity to the principles of the unifying articular (synovial) theory. *Neurosurg Focus* 2009;**26**:E10,1–9.
4. Naam NH, Carr SB, Massoud AH. Intraneural ganglions of the hand and wrist. *J Hand Surg Am* 2015;**40**(8):1625-30
5. Kato H, Hirayama T, Minami A, Iwasaki N, Hirachi K. Cubital tunnel syndrome associated with medial elbow ganglia and osteoarthritis of the elbow. *J Bone JtSurg Am* 2002;**84-A**(8):1413-9
6. Allieu PY, Cenac PE. Peripheral nerve mucoid degeneration of the upper extremity. *J Hand Surg Am* 1989;**14**(2 Pt 1):189-194
7. Mobbs RJ, Phan K, Maharaj MM, Chaganti J, Simon N. Intraneural ganglion cyst of the ulnar nerve at the elbow masquerading as a malignant peripheral nerve sheath tumour. *World Neurosurg*2016;**96**:613.e5-613.e8
8. Spinner RJ, Desy NM, Amrami KK. Sequential tibial and peroneal intraneural ganglia arising from the superior tibiofibular joint. *Skeletal Radiol*2008;**37**:79–84.
9. Spinner RJ, Desy NM, Rock MG, Amrami KK. Peroneal intraneural ganglia. Part I. Techniques for successful diagnosis and treatment. *Neurosurg Focus* 2007;**22**:E16, 1–10.
10. Spinner RJ, Amrami KK, Angius D, Wang H, Carmichael SW. Peroneal and tibial intraneural ganglia: correlation between intra- epineurial compartments observed on magnetic resonance images and the potential importance of these compartments. *Neurosurg Focus* 2007;**22**:E17, 1–10.

ORIGINAL ARTICLE

The Use of A Random Pattern Fasciocutaneous Flap for Coverage of Exposed Bone on The Hind Limb of A Rothschild's Giraffe (Giraffa Camelopardalis Rothschildi)

Dr. M. Adil Abbas Khan, Dr. Ammar A. Javed, Dr. Colin M. Morrison, Dr. Robert Bains, Mr. Michael Griffith, Ms. Linda Morrison, Dr. Muhammad Riaz

ABSTRACT

We report the use of a random pattern fasciocutaneous flap to cover exposed bone in the hind limb of an 8-month old, hand reared, male Rothschild giraffe (Giraffa camleopardis rothschildi) four weeks after a suspected traumatic injury. Under general anaesthesia, a medially based, fasciocutaneous flap was raised, transposed and inset to cover an area of exposed metatarsus. The donor site was resurfaced with an autologous split thickness skin graft harvested from the ipsilateral thigh of the giraffe. The recipient site experienced delayed healing due to an initial wound infection and post-operative management of the flap recipient site involved dressing changes, wound toilet, analgesia and antibiotics. Follow-up showed good flap take providing the animal with stable, durable and functional soft tissue reconstruction.

Key Words: *fasciocutaneous flap, exposed bone, Rothschild giraffe (Giraffa camelopardis rothschildi)*

Introduction

Wounds with soft tissue loss and exposed bone in the distal part of a limb frequently require specialist reconstruction. Resurfacing such large complex limb defects can be a challenge in both humans and animals. The initial rungs of the reconstructive ladder involving delayed healing by secondary intention or skin grafting may not be feasible in an avascular wound bed[1]. Pedicled fasciocutaneous flaps for bony cover are well documented in humans and have also been described in small [2] and large animals [3,4]. We describe the successful use of a local fasciocutaneous flap to cover an area of exposed metatarsus in a giraffe. Also an interesting aspect was the anaesthetic approach taken to operate on a giraffe, particularly given its anatomy with special focus on the long length of the neck

Dr. Ammar Asrar Javed M.D.
Lead Postdoctoral Research Fellow and Senior Research Program Coordinator
Department of Surgery, The Johns Hopkins School of Medicine,
600 N. Wolfe St./ Blalock 1222A
Baltimore, Maryland(MD), 21287
Telephone: 667.208.7086
Fax:410.588.6681

Case

An 8-month-old, hand reared, male giraffe incurred an injury to the right hind limb below the hock following an unobserved incident. It was suspected that the giraffe caught the limb under a gate and sustained the injury while attempting to free itself. This resulted in a laceration on the craniolateral aspect of the limb with soft tissue loss and an area of exposed metatarsal bone. Physical examination and plain radiographs did not reveal evidence of a fracture and the animal showed no signs of discomfort.

The animal was estimated at 150-200kg and all dosages of medications were estimated using a combination of previous doses used in the zoo and recommended dose rates. All resultant calculated doses were thus illustrated as the absolute amount. Medical

wound management was attempted using amoxicillin (Betamox LA, Norbrook UK) and wound dressings. The wound dressings were comprised of hydrogel (IntraSite gel, Smith & Nephew) or petrolatum-impregnated gauze pads (Jelonet, Smith & Nephew), polyester-covered absorptive cotton sheets (Melolin, Smith & Nephew) and/or cotton wool, lightweight conforming bandage (K-band, Urgo) and bandaging tape (3M™ Vetrap™ Bandaging Tape). Bacterial culture and sensitivity testing revealed a resistant Proteus species and therefore antibiotic was changed to enrofloxacin (Baytril Max, Bayer UK). After several weeks, there was still no evidence of healing and the soft tissue defect with bony exposure had almost doubled in size (Figure 1)

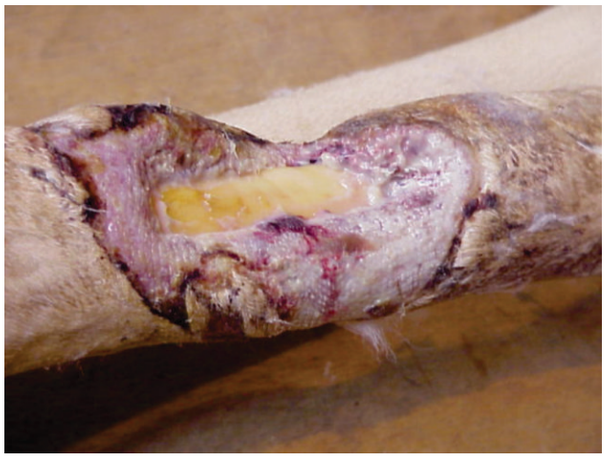


Figure 1: Preoperative photograph of the soft tissue defect before debridement. The exudate overlying the granulation tissue and necrotic wound edges were debrided and the bony cortex minimally burred to expose healthy bleeding bone.

The zoo vets liaised with Plastic Surgeons to avoid euthanasia of the animal by considering surgical management as a last resort four weeks after conservative management failed to heal the wound. Pre-operative assessment included temporary exclusion of the animal from the herd, fresh microbiology swabs, and jugular blood samples which were within normal haematological and biochemical ranges (ISIS December 1999).

Anaesthesia and Surgical Technique

A general anaesthetic of 9mg sublingual medetomidine (Zalopine 10mg/ml, Orion Pharma, Finland) and 150 mg ketamine (Vetalar-V 100 mg/ml, Pfizer Ltd) was administered by hand injection and then surgical anaesthesia was maintained with the giraffe in left lateral recumbent position, on a make shift surgical table made of bales of hay (Figure 2)

Figure 2: The makeshift operating table made of bales of hay in the giraffe's enclosure.

using oxygen and isoflurane (Isoflurane-Vet, Merial Animal Health, Ltd) via a 12mm on a large animal Steven's anaesthetic machine using a circle circuit. (Figure 3)

Figure 3: The intubation tube consisting of a long rubber pipe inserted intranasally.

The surgical site was prepped by iodine solution and thoroughly irrigated with saline. Necrotic and infected tissue was debrided, till healthy bone could be visualized. A random patterned, pedicled fasciocutaneous flap measuring 15 x 5cm was raised (wound size 12cmx14cm) from the medial side of the leg (Figure 4).

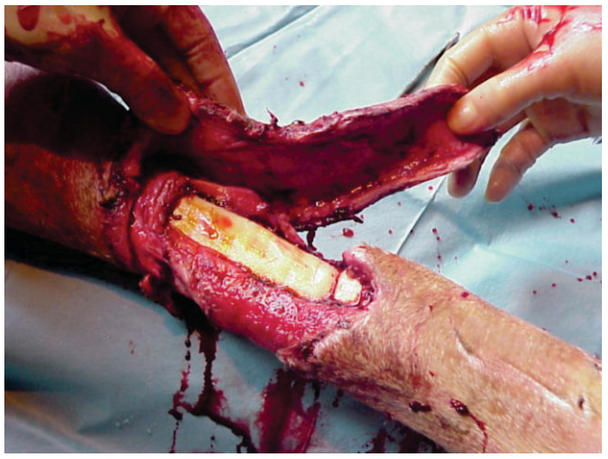


Figure 4: The superiorly based local fasciocutaneous flap harvested from the medial aspect of the hind limb.

Additional circumferential undermining proximally was required to ensure complete wound coverage. The flap was secured with simple interrupted, 2/0 (Polyglactin 910) suture (Vicryl rapide, Ethicon).
The donor defect was resurfaced using a split thickness skin graft, taken with a Humby skin graft knife (Downs Surgical, Sheffield, UK), from the ipsilateral thigh (Figure 5).

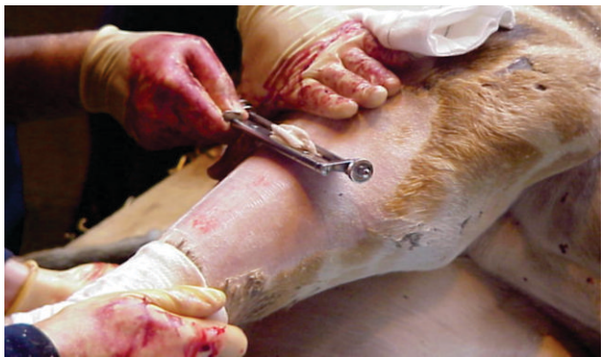


Figure 5: Harvesting the split thickness skin graft with a Humber knife after shaving the ipsilateral lateral thigh

The graft was secured with staples (3M™ Precise™ Disposable Skin Staplers) and the wound dressed with iodine soaked gauze.

Finally, recipient site of the graft was dressed with kaltostat and Mefix ™ (SCA Molnlycke Ltd.), an adhesive retention dressing that is commonly used in humans. Though attempts were made at placing drains at the recipient site it was not possible given the thick and rough nature of the skin. The surgical procedure took 90 minutes after which the anaesthesia was reversed using 45mg of intravenous atipamezole (Antisedan, Pfizer UK) and the giraffe was able to stand unaided after 6mins.

The giraffe was returned to the herd 3 hours later. The Mefix ™ dressing became detached from the donor site within the first 48 hours. This wound was left uncovered and healed without complications. Suction drains (Blake Drains™, Ethicon, Inc.) were attempted but were not found to be effective.

The recipient site however required more intensive management. Dressing changes were required every 48 hours initially with an increased inter-dressing interval as the wound gradually closed. Wet to dry dressings and dry dressings using combinations of the materials described above, with the exception of Jelonet, were applied. The dressing change was performed within the holding pens and required an anaesthetic. Medetomidine (as above) and ketamine (as above) were used, while atipamezole (Antisedan, Pfizer UK) was used for reversal. Initially the dressing changes lasted 10 minutes during a total 30-minute anaesthetic period, reducing to 5 minutes during a total 20-minute anaesthetic period. Dressing changes were performed aseptically and the wound was always flushed with copious amounts of sterile saline (Isolec LA solution, IVEX, Larne). 250mg of carprofen (Rimadyl LA solution, 50mg/ml,

Pfizer UK,) was used for 6 weeks post-operatively for both analgesic and anti-inflammatory effects. 750mg gentacin (Pangram 5%, 50mg/ml, Bimeda) was used for 2 weeks post-operatively then 300mg marbofloxacin (Marbocyl 10%, 100mg/ml, Vétoquinol UK) and 1500mg enrofloxacin (Baytril Max, 100mg/ml, Bayer UK) for a further 2 months as suggested by culture and sensitivity testing (which was performed every 2weeks).

Despite these practices, the wound became infected superficially with a mixed bacterial population, including a multi-resistant Pseudomonas (sensitive to gentamicin), which led to partial wound breakdown. Systemic antibiotics were stopped as it was suspected that they were contributing to development of resistance rather that effectively controlling infection. Copious wound lavage and regular sterile dressing changes were used to manage the superficial wound infection for a total of 10 weeks resulting in healing. Nine months after surgery, minor trauma to the wound required medical management using dressings as before and antibiotics for 7 weeks. 18 months later the giraffe was re-homed to another zoo. The animal was able to ambulate normally throughout this period (Figure 6).

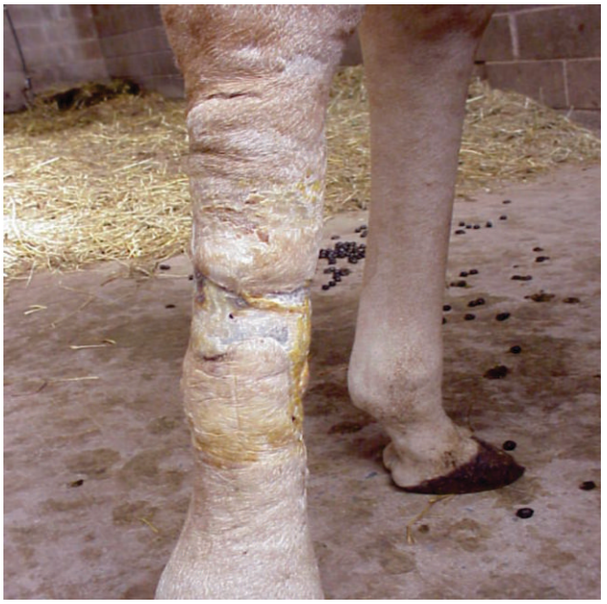


Figure 6: Twelve months post-operative view of the healed fasciocutaneous flap over the giraffe's fully functional and weight bearing right hind limb.

Four years after the initial operation, however, the site of initial flap reconstruction suffered recurrent wound breakdown and infection necessitating the giraffe to be euthanized.

Discussion

Two aspects of this case need to be discussed in detail; the anaesthetic approach and wound management. Long general anaesthetics in larger animals can pose a significant risk of increasing morbidity or mortality. Complications such as post-anaesthetic paresis or paralysis have been observed. This is a particular problem in the giraffe, with difficulties in airway management and blood pressure control being recognised hazards. In total the giraffe underwent 71 anaesthetics over a period of 11 months. Repeated blood sampling revealed no significant alteration in biochemical and haematological parameters throughout this period. The anaesthetic management of the giraffe in our case was successful and no anaesthesia related complications were experienced. We therefore suggest that in future while performing surgical operations involving larger animals the management we adopted may be considered.

The priorities in surgical wound management are irrigation and debridement of all necrotic tissue, fracture fixation, if necessary, and soft tissue reconstruction. Bone exposure precludes skin grafting, so in many cases local or distant flaps are required. These may be muscle, myocutaneous, adipofascial or fasciocutaneous flaps. Due to the significant anaesthetic risk, in cases where well-equipped operating facilities are not available, shorter, simpler procedures such as local fasciocutaneous flaps are preferable. They provide us with a simple reconstructive

option, involving short anaesthetic time, which is ideal for cases like ours, involving minimal tissue dissection. These flaps can also be raised without requirement of specialist theatre, equipment and can either be based on a known pedicle or vascular perforator or be entirely random patterned. Since the exact microvascular anatomy of the skin in the giraffe has not been described to date, a random pattern pedicle local fasciocutaneous flap we believe is a more feasible option.

The giraffe tolerated the dressings well. Wet to dry dressings and dry dressings were found to be the most effective and easiest to apply. The Mefix ™ dressing was presumed to have become detached due to limited adhesiveness to the rough, haired skin of the giraffe. However, dressing interference by herd members may also have contributed. When the wound became infected later in the recovery period, several unsuccessful attempts were made to use a suction drain which we attributed to the thick and rough skin of the giraffe, which made it impossible to maintain the negative pressure required for the drain to work efficiently. Topical cleansing and dressing changes appeared to be more effective than antibiotics in control of wound infection in our case. This may be due to difficulties in assessing an accurate weight for a growing animal and/or possibly altered pharmacokinetics of the drugs in the giraffe.
Both the anaesthetics and repeated handling were well tolerated. The animal could be maintained with the rest of the herd during the entire time without interference to the dressing. We believe that this can be attributed to the fact that the giraffe was hand reared.

When managing wounds on larger animals, medical treatment is often the initial approach, with surgical treatment reserved for animals of significant economic or emotional value. We believe that an earlier intervention would have been beneficial in this case and would have helped in avoiding any of the aforementioned acute and intermediate post-operative complications. Similarly, the final outcome of the animal being euthanized, highlights an important principle that while the reconstruction worked, earlier intervention would have been more appropriate. This view has been already reported for soft tissue reconstruction employing both flaps and grafts, in the equine model as this large animal species is likely to have such procedures done due to its economic value [5]. Our intervention however, managed to give the animal a reprieve of a few years which is significant especially in any large endangered species of high genetic value. In addition, this case has novel value as surgery of this nature has never been previously performed in a giraffe.

In conclusion, a fasciocutaneous flap, performed acutely after injury, is an effective method of reconstructing an extensive soft tissue wound in large animals such as a giraffe. Reconstructive surgical techniques described in man and other animals may be considered useful in the giraffe but further research may still be required to identify optimal approach and treatment. A random pattern fasciocutaneous flap performed with the aforementioned anaesthetic management proved to be effective in reconstructing an extensive soft tissue wound in this animal.

Acknowledgements
We would like to thank staff of Belfast zoo for all their hard work and consistent support.

References

1. Fix R.J., V.L.O., Fasciocutaneous flaps in reconstruction of the lower extremity. Clin. Plast. Surg. , 1991. 18: p. 571.2.
2. Skin grafting and reconstruction techniques IN: Bojrab M.J., E.G.W., Slocum B. Current Techniques in Small Animal Surgery, 4th Edition, Williams and Wilkins: Chap 37, P585-642.3.
3. Wilson D.G. Applications of skin grafting in large animals, P.V.M.S.-.
4. Schumacher J, S.G.I.A.J., Stick J., Equine Surgery, Third edition, Saunders+Elsevier: Chapt 25, P269.5.
5. Bristol, D.G., et al., The isolated perfused equine skin flap. Preparation and metabolic parameters. Vet Surg, 1991. 20(6): p. 424-33.

CASE REPORT

Case Report of Maffucci's Syndrome

Dr. Nayab Samar, Dr. Hyder Ali, Dr. Asadullah Awan, Muhammad Ashraf Ganatra

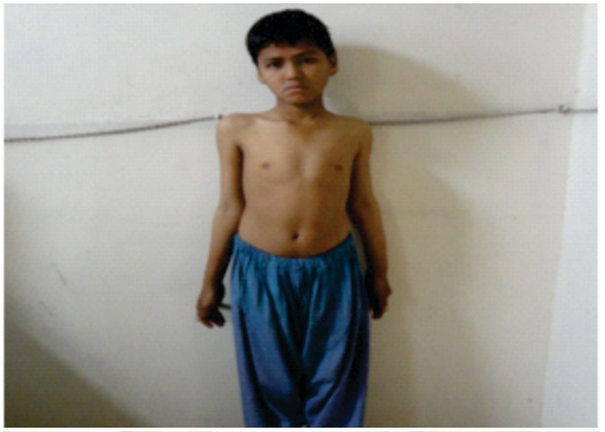
INTRODUCTION:

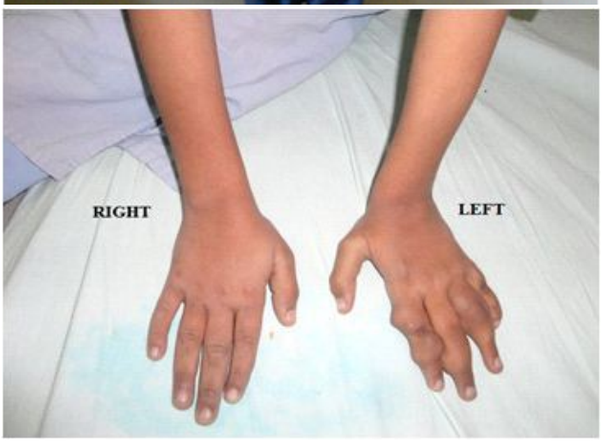
Maffucci's syndrome is a congenital, non-hereditary mesodermal dysplasia manifested by multiple enchondromas and hemangiomas.

Key Words: *maffucci's syndrome, enchondromas, hemangiomas.*

CASE REPORT:

A 9 years old boy presented with multiple swellings of the left hand since last 5 years (Fig. 1).





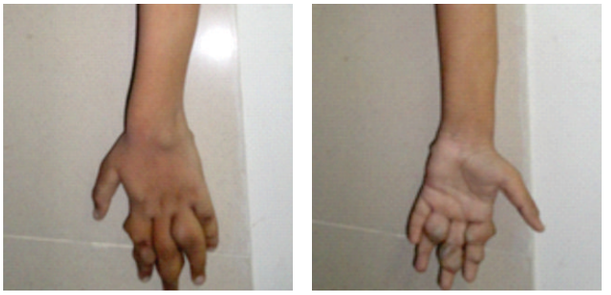


Fig. 1: The patient's presentation

The patient complained of intermittent pain in the swelling and hindrance in the day to day to work due to swellings. On examination swellings were multiple, bluish colored, of variable sized and shaped,non tender, normo-thermic, soft to firm ,compressible, non pulsatile with no bruit and thrill (Fig. 2).

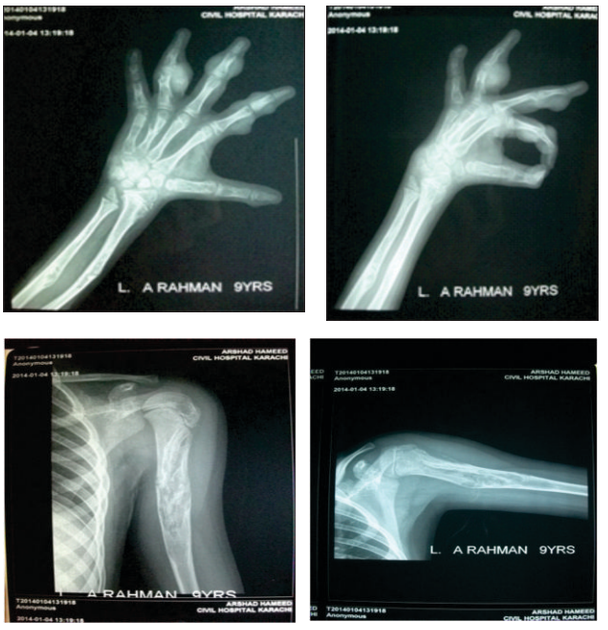


Fig. 2: Radiological findings

Muhammad Ashraf Ganatra
Dept. of Plastic Surgery, Dow University Health Sciences &Civil Hospital, Karachi.

There were palpable phleboliths . Swellings tend to increase with gravity.

Blood chemistry was normal along with coagulation profile. Radiographs shows multiple expansile osteolytic lesions involving midshaft of radius and ulna and middle phalanx of ring finger and distal end of radius (Fig. 3).

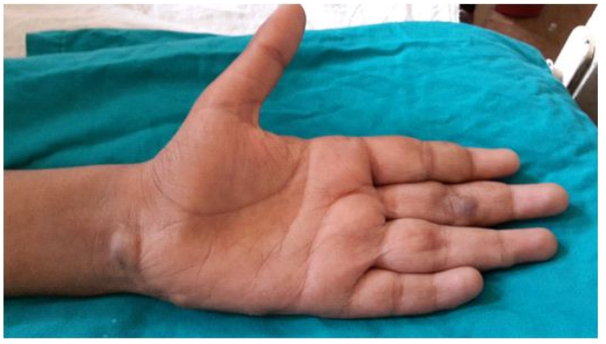


Fig.3 Postoperative result

Multiple soft tissue density lesions of 1st 2nd 3rd 4th fingers with multiple phlebolithsSkeletal survey including x-rays of chest, skull and spine did not reveal any abnormality.

All the lesions were excised and sent for histo-pathological examination (Fig. 4). Patient's parents were counseled about complications of disease especially about risk of malignant transformation.

Histopathology report showedsmall to medium sized blood vessels lined by flattened endothelial cells .Intervening tissue shows areas of congestion with extravasation of red blood cells. No evidence of fibromatosis, granuloma or malignancy was seen. Findings suggestive of vascular malformation. Histopathology of the hard nodules revealed mature lobules of hyaline cartilage in which foci of myxoid degeneration, calcification and endochondral ossification was seen.Findings were consistent with enchondromas.

DISCUSSION:

This rare syndrome was first reported by Maffucciin 1881, after a 40-year-old patient had frequent and severe bleeding that led to amputation of a distal extremity. The patient died of complications secondary to infection. Maffucci described a thorough autopsy and reported all the main points of the syndrome that was to be named after him. Carleton [1] proposed the eponym Maffucci syndrome in 1942 *Maffucci's syndrome is a combined slow flow malformation,denotes the coexistence of exophytic venous anomalies,with bony exostoses &enchondromatoses."*

It's a rare disease, less than 200 cases reported worldwide. It has no familial, racial & sexual predilection. It is not associated mental or psychiatric abnormalities.[2] It can manifests early in life(4-5y) but 78% of them manifest by puberty[3].

Enchondromas exists not only most frequently at the small bones of the hands and feet, the long tubular bones, but also the flat bones, such as pelvis. Enchondromas are usually in close proximity to or in continuity with growth plate cartilage. Consequently, they might be the result from abnormal regulation of proliferation and terminal differentiation of chondrocytes in the adjoining growth plate. The osseous lesions most frequently involve the phalanges, metacarpals and metatarsal. [4]

Maffucci syndrome might be associated with three types of vascular lesions: cavernous hemangiomas, phlebectasiasand lymphangiectasias-lymphangiomas . Clinical problems caused by enchondromas include skeletal deformity and the potential for malignant change, reported in approximately 30% of reported cases.[4]

Complications develop are pathological fractures, growth abnormalities and malignant transformation. Malignant transformation is a common complication and one should look for Radiologic evaluation of suspicious areas . Evidence of malignant transformation includes cortical destruction, endosteal cortical erosion, and zones of lucency within a previously mineralized area.[5]

Chondrosarcomas, the most common

malignant neoplasm associated with Maffucci syndrome, are diagnosed by poorly differentiated pleomorphic chondrocytes.[6] Maffucci syndrome patients have normal life expectancy if there are no complications.

CONCLUSION:

Though Maffucci's syndrome is rare, knowledge of its occurrence and complications to Plastic Surgeon can lead to better management.

REFERENCES:

1. Carleton A, Elkington J, Greenfield JG, et al. Maffucci's syndrome (dyschondroplasia with hemangiomata).Q J Med 1942;35:203-28
2. McDermott AL, Dutt SN, Chavda SV, et al. Maffucci's syndrome: clinical and radiological features of a rare condition. J LaryngolOtol, 2001;115:845-7.
3. Lewis RJ, Ketcham AS. Maffucci's syndrome:functional and neoplastic significance—case report and review of the literature. J Bone Joint Surg Am 1973; 55:1465–1479.
4. Gao H,WangB,ZhangX,LiuF,Lu Y. Maffucci syndrome with unilateral limb: a case report and review of literature. Chin J Cancer Res 2103;25(2):245-258.
5. Mainzer F, Minagi H, Steinbach HL. The variable manifestations of multiple enchondromatosis. Radiology 1971; 99:377–388.
6. Unroe BJ, Kissel CG, Rosenberg JC. Maffucci's syndrome. Review of the literature and case report. J Am Pediatr Med Assoc1992;82:532-6.
7. Schwarzt HS, Zimmerman NB, Simon MA, et al. The malignant potential of enchondromatosis. J Bone Joint Surg 1987;69A:269-74.

CASE REPORT

'Trifid Nose'- A rare case of nasal duplication

Mr. Lubna Khan , Mr. Mohammed Riaz

Introduction:
Developmental anomalies of the nose encompass a wide and diverse group of conditions. Nasal dysplasia can range from a supernumery nostril to a complete duplication of the nose[1]. These anomalies can be associated with malformations such as facial clefts and can be unilateral or bilateral, most reported cases are unilateral. A number of cases of supernumery nostril have been reported in the literature and although anomalies of the face and nose are not rare in themselves, cases of nasal duplication are extremely rare with only a few reported cases since Lindsay in 1906[2]. Herein we report an extremely rare and unusual case of nasal duplication in the form of a trifid nose.

Key Words: *trifid nose, nasal duplication.*

CASE REPORT-

A two-year old girl presented with a congenital anomaly of the right hemi-face. The child, born at full term without complication was the first-born child to non-consanguineous parents. There was no family history on the maternal or paternal side of congenital malformations. On examination, a fully formed separate duplication of the right nostril was found 2cm to the right of midline. The duplicated nostril had a nasal cavity and fully formed septum. The was not communicating with the ipsilateral nostril (figure 1). A small blind-ending sinus was found at the superior pole of the duplicated nostril, lateral to the nasal bridge at the medial canthus. No other anomaly was found.

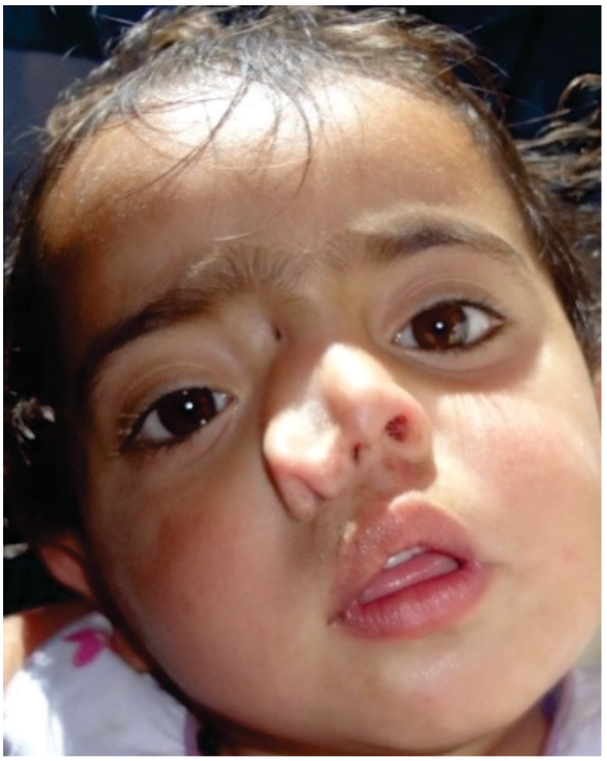


Figure 1- Pre-operative presentation of nasal duplication

The child underwent excision of the duplicated nostril under general anaesthetic (see Figures 2) and the wound was amenable to direct closure. She had an uneventful post-operative course and a successful aesthetic outcome (Figure 3).

Mr. Lubna Khan
Mr. Mohammed Riaz
Registrar Plastic Surgery, Castle Hill Hospital, Hull. UK
Consultant Plastic and Reconstructive Surgeon, Castle Hill Hospital, Hull. UK

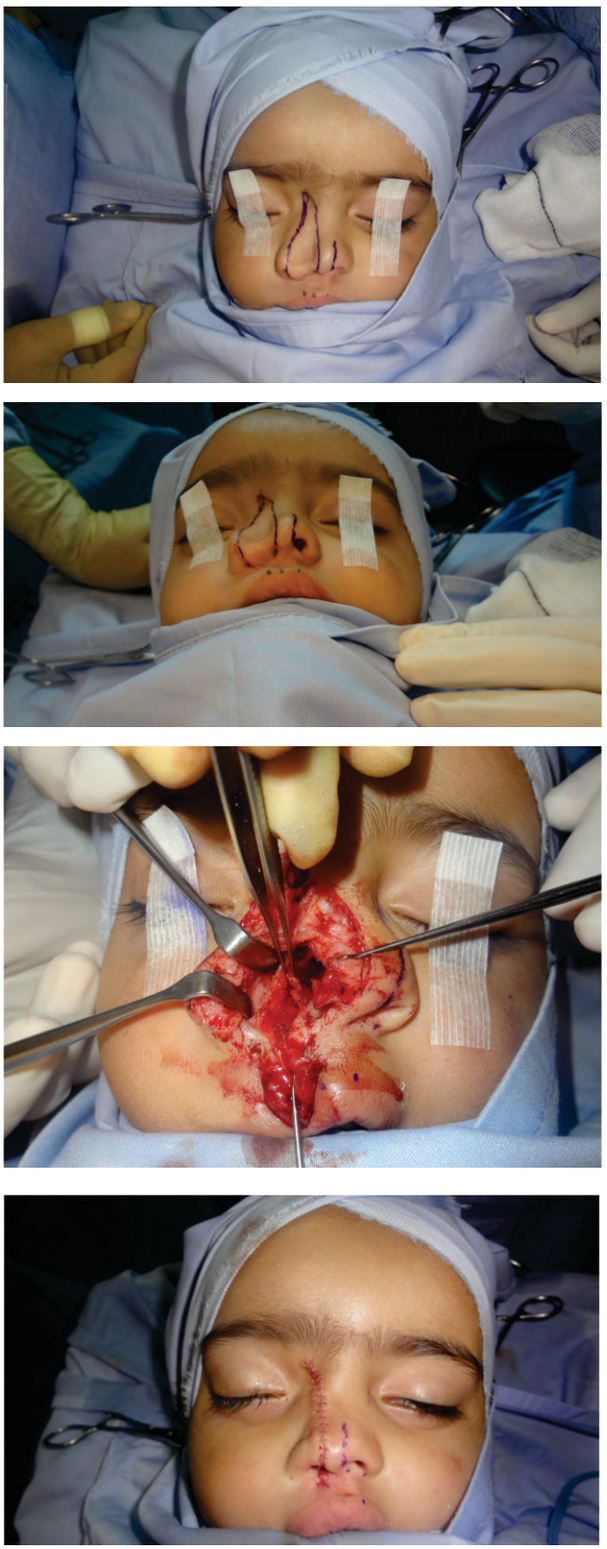


Figure 2
Photographs showing the pre-operative markings, intra-operative excision of duplicated nostril and septal cartilage and the immediate post-operative result.

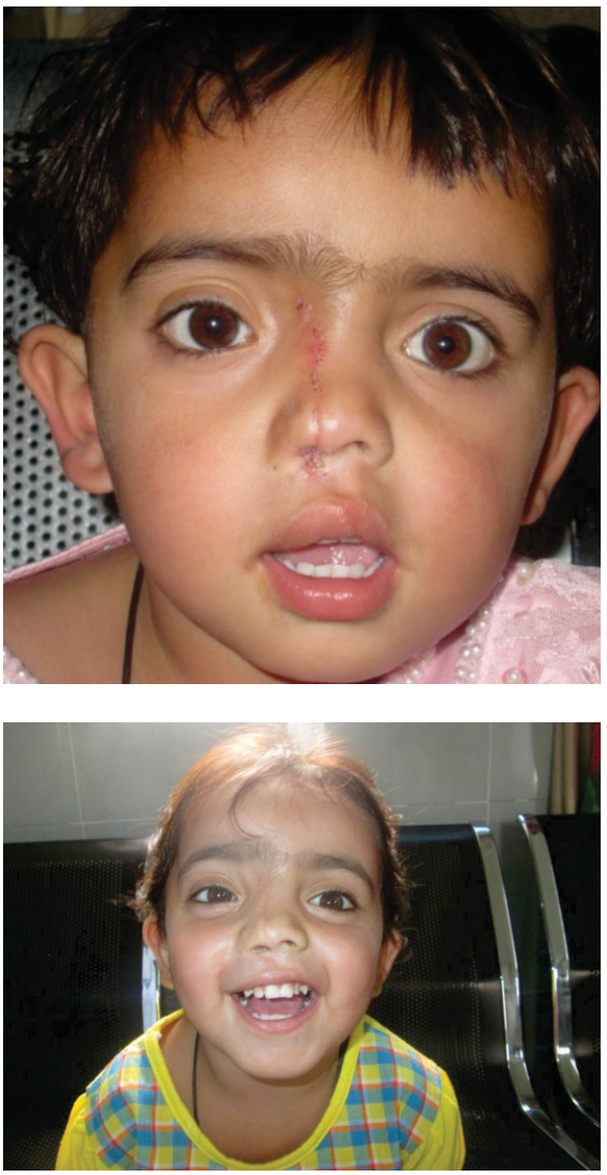


Figure 3: Serial post-operative follow-up pictures showing a pleasing aesthetic result.

DISCUSSION-

The embryological development of the nose and surrounding structures is extremely complex and yet significant developmental nasal anomalies are rare.

The development of the nose starts around the 4th embryological week of development and originates in the bilateral nasal placodes[3].

The nasal placode, which arises from surface ectoderm, develops on the lateral aspects of the frontal prominence. The nasal placodes invaginate around the 5th week of gestation to form the nasal pits that are widely spaced on the anterolateral sides of the developing head of the embryo. As the invagination continues, a tissue ridge surrounding each pit forms the nasal prominences. Prominences on the outer edge of the pits are the lateral nasal prominences; those on the inner aspect are the medial nasal prominences. The depression separating the maxillary swelling from the lateral nasal prominences is known as the nasolacrimal groove, which eventually gives rise to the nasolacrimal apparatus[4]. The middle of the external nose develops from caudal progression of the medial nasal folds, which fuse to form the frontonasal process. Three paired centres of chondrification form the lateral nasal cartilages. Nasal septum bony formation over the cartilaginous capsule occurs during the eighth week.

The maxillary processes fuse with the medial nasal processes, and separates the nasal and oral cavities. The nasal pit invaginates further and breaks through the oral cavity. Development requires enlargement of the nasal cavity, degeneration of existing tissues, and generation of mesenchyme-derived structures. Subsequently, between the 6th and 12th weeks of gestation, the secondary palate is formed as the result of fusion between palatal processes, growing from the oral surface of the maxillary processes. Each merging and fusion site is the potential site of facial or palatal cleft[4].

Losee et al (2004) developed a comprehensive classification scheme dedicated to congenital nasal anomalies which was based on a retrospective review of 261 patients with congenital nasal anomalies and described 4 categories[5].

- Type I - Hypoplasia and atrophy (represents paucity, atrophy, or underdevelopments of skin, subcutaneous tissue, muscle, cartilage, and/or bone)
- Type II - Hyperplasia and duplications (represents anomalies of excess tissue, ranging from duplications of parts to complete multiples)
- Type III - Clefts (The comprehensive and widely used Tessier classification of craniofacial clefts is applied)
- Type IV - Neoplasms and vascular anomalies (Both benign and malignant neoplasms are found in this category)

Using the above classification system, our case report would fit in with a Type II hyperplasia and duplication. Duplication of the nose is one of the rarest congenital nasal deformities with only a handful of reported cases in the literature.

The first reported case of a nasal anomaly was over 100 years ago by Lindsay (1906)[2]. It was described to be different from the double nose with two septae and four nostrils and nasal cavities. According to a case report by Erich in 1962[6], during the course of the evolution of the nasal placode, four nasal pits appeared horizontally, each became a nasal sac, and the medial two which were interposed between the two nasal laminae, prevented the laminae from fusing into one nasal septum. This resulted in double nose. Supernumerary nostril is formed when the accessory nasal pit is located so laterally to the nasal lamina that the accessory nostrils are formed above the natural nostril and thus do not disturb the fusion of the nasal laminae. Nakamura in 1987[7] hypothesized that during the proliferation of mesenchymal cells in the lateral nasal process, a concavity or fissure appears in this area accidentally, and thus this lateral nasal process is divided into two segments, resulting in two nostrils and two alae on one side.[7] This hypothesis can

extrapolate the appearance of accessory nostril either above or lateral to the natural nostril or medially, depending on the position of change in the lateral nasal process.

The importance of removing superfluous structures and reconstructing the normal anatomy is stressed to optimize the aesthetic outcome. As demonstrated in our case, timing of surgery is also important when managing nasal anomalies. Excision performed at an early age, in this case pre-school (similar to the approach taken in cleft lip/palate surgery) avoids any serious impact on the nasal cartilages, or adjacent structures, reduces potential anaesthetic complications and also the psychological impact of such an anomaly to the face.

REFERENCE:

1. Zbar RI et al. Repair of congenital anomalies involving redundancy of structures. *J Cleft Palate Craniofacial Surg* 2003;40(2):214-7
2. Lindsay B. A nose with supernumery nostrils. *Transactions of the Pathology Society of London*. 1906;57:329-36
3. Kim CH, Park HW, Kin K et al, Early development of the nose in human embryos. *Laryngoscope* 2004;114:1791-800
4. Bossy J. Development of olfactory and related structures in stages human embryos. *Anatomy of Embryology*. 1980;161:225-36
5. Losee JE, Kirschner RE, Whitaker LA, Bartlett SP et al, Congenital nasal anomalies: a classification scheme. *Plast Reconstr Surg* 2004;113(2) 676-689
6. Erich JB. Nasal Duplication: Report of case of a patient with two noses. *Plast Reconstr Surg*. 1962;29:159
7. Nakamura K, Onizuka T. A case of supernumery nostril. *Plast Reconst Surg*. 1987;80:436-41

INSTRUCTION TO AUTHORS

All material submitted for publication should be sent exclusively to the Pakistan Journal of Plastic Surgery. Work that has already been reported in a published paper or is described in a paper sent or accepted elsewhere for publication should not be submitted. Multiple or duplicate submission of the same work to other journal should be avoided as this fall into the category of publication fraud and are liable for disciplinary consequences, including reporting to Pakistan Medical & Dental Council and Higher Education Commission. A complete report following publication of a preliminary report, usually in the form of an abstract, or a paper that has been presented at a scientific meeting, if not published in full in a proceedings or similar publication, may be submitted. Press reports of meetings will not be considered as breach of this rule, but additional data or copies of tables and illustrations should not amplify such reports. In case of doubt, a copy of the published material should be included with a manuscript to help the editors decide, how to deal with the matter.

Authors can submit their articles by post or by E-mail: mughese@yahoo.com to the Managing Editor, Pakistan Journal of Plastic Surgery. Article can also be submitted by post or by hand on a Compact Disc (CD) with three hard copies (laser copies or inkjet, photocopies are not accepted). Articles submitted by E-mail do not require any hard copy or CD.

General archival and linguistic instructions.

The author should submit the manuscript typed in MS Word. Manuscripts should be written in English in past tense and third person form of address. Sentences should not start with a number or figure. Any illustrations or photographs should also be sent in duplicate. Components of manuscript should be in the following sequence: a title page (containing names of authors, their postal and Email addresses, fax and phone numbers, including mobile phone number of the corresponding author), abstract, key words, text, references, tables (each table, complete with title and footnotes) and legends for illustrations and photographs. Each component should begin on a new page. The manuscript should be typed in double spacing as a single column on A4 (8-1/2" x 11" or 21.5 cm x 28.0 cm), white bond paper with one inch (2.5 cm) margin on one side.

Material for Publication.

The material submitted for publication may be in the form of an Original research (Randomized controlled trial - RCT, Metaanalysis of RCT, Quasi experimental study, Case Control study, Cohort study, Observational Study with statistical support etc), a Review Article, Commentary, a Case Report, Recent Advances, New techniques, Debates, Adverse Drug Reports, Current Practices, Clinical Practice Article, Short Article, KAP (Knowledge, Attitudes, Practices) study, An Audit Report, Evidence Based Report, Short Communication or a Letter to the Editor. Ideas and Innovations can be reported as changes made by the authors to an existing technique or development of a new technique or instrument. A mere description of a technique without any practical experience or innovation will be considered as an update and not an original article. Any study ending four years prior to date of submission is judged by Editorial Board for its suitability as many changes take place over the period of time, subject to area of the study. Studies more than four years old are not entertained. JCPCP also does not accept multiple studies/ multiple end publications gathered/derived from a single research project or data (wholly or in part) known as 'salami slices'.

Original articles should normally report original research of relevance to clinical medicine. The original paper should be of about 2000-2500 words excluding abstract and references. It should contain a structured abstract of about 250 words. Three to 10 keywords should be given for an original article as per MeSH (Medical Subject Headings). There should be no more than three tables or illustrations. The data should be supported with 20 to 25 references,

which should include local as well as international references. Most of the references should be from last five years from the date of submission.

Clinical Practice Article is a category under which all simple observational case series are entertained. The length of such article should be around 1500 - 1600 words with 15 - 20 references. The rest of the format should be that of an original article. KAP studies, Audit reports, Current Practices, Survey reports and Short Articles are also written on the format of Clinical Practice Article. Evidence based reports must have at least 10 cases and word count of 1000-1200 words with 10 - 12 references and not more than 2 tables or illustrations. It should contain a non-structured abstract of about 150 words. Short communications should be of about 1000 words, having a nonstructured abstract of about 150 words with one table or illustration and not more than five references. Clinical case reports must be of academic and educational value and provide relevance of the disease being reported as unusual. Brief or negative research findings may appear in this section. The word count of case report should be 1200-1500 words with a minimum of 3 key words. It should have a non-structured abstract of about 100-150 words (case specific) with maximum of 10 references.

Review article should consist of critical overview/analysis of some relatively narrow topic providing background and the recent development with the reference of original literature. It should incorporate author's original work on the same subject. The length of the review article should be of 2500 to 3000 words with minimum of 40 and maximum of 60 references. It should have non-structured abstract of 150 words with minimum 3 key words. An author can write a review article only if he/she has written a minimum of three original research articles and some case reports on the same topic.

Letters should normally not exceed 400 words, with not more than 5 references and be signed by all the authors-maximum 3 are allowed. Preference is given to those that take up points made in contributions published recently in the journal. Letters may be published with a response from the author of the article being discussed. Discussions beyond the initial letter and response will not be entertained for publication. Letters to the editor may be sent for peer review if they report a scientific data. Editorials are written by invitation.

Between 3 to 10 key words should be given for all the category of manuscripts under the abstracts as per mesh [medical subject heading].

Dissertation / Thesis Based Article.

An article, based on dissertation, approved by REU, submitted as part of the requirement for a Fellowship examination of the PJPS, can be sent for publication provided the data is not more than four years old. Approval of REU is not required for an article submitted for second fellowship examination in lieu of dissertation. The main difference between an article and a dissertation is the length of the manuscript, word count, illustrations and reference numbers. Dissertation based article should be re-written in accordance with the journal's instructions to the author guidelines. Such articles, if approved, will be published under the category of Dissertation based article.

Ethical Considerations.

If tables, illustrations or photographs, which have already been published, are included, a letter of permission for re-publication should be obtained from author (s) as well as the editor of the journal where it was previously published. Written permission to reproduce photographs of patients, whose identity is not disguised, should be sent with the manuscript; otherwise the eyes will be blackened out. If a medicine is used, generic name should be used. The commercial name may, however, be mentioned only within brackets, only if necessary. In case of medicine or device or any material indicated in text, a declaration by author/s should be submitted that no monetary benefit has been taken from manufacturer/importer of that product by any author. In case of experimental interventions, permission from ethical committee of the hospital

should be taken beforehand. Any other conflict of interest must be disclosed. All interventional studies submitted for publication should carry Institutional Ethical & Research Committee approval letter.
Ethical consideration regarding the intervention, added cost of test, and particularly the management of control in casecontrol comparisons of trials should be addressed: multicentric authors' affiliation may be asked to be authenticated by provision of permission letters from ethical boards or the heads of involved institutes.

Tables and Illustrations.
Legends to illustrations should be typed on the same sheet. Tables should be simple, and should supplement rather than duplicate information in the text; tables repeating information will be omitted. Each table should have a title and be typed in double space without horizontal and vertical lines on an 8-1/2" x 11" (21.5 x 28.0 centimeters) paper. Tables should be numbered consecutively with Roman numerals in the order they are mentioned in the text. Page number should be in the upper right corner. If abbreviations are used, they should be explained in footnotes. When Graphs, scatter grams, or histograms are submitted, the numerical data on which they are based should be supplied. All graphs should be made with MS Excel and other Windows/Macintosh compatible software such as SAS and be sent as a separate Excel file, even if merged in the manuscript.

S.I. Units.
System International (S.I) Unit measurement should be used. Imperial measurement units like inches, feet etc are not acceptable.

Figures and Photographs.
Photographs, X-rays, CT scans, MRI and photomicro-graphs should be sent in digital format with a minimum resolution of 3.2 mega pixels in JPEG compression. Photographs must be sharply focused. Most photographs taken with a mobile phone camera do not fulfill the necessary requirements and, therefore, not acceptable for printing. The background of photographs must be neutral and preferably white. The photographs submitted must be those originally taken as such by a camera without manipulating them digitally. The hard copy of the photographs if sent, must be unmounted, glossy prints, 5" x 7" (12.7 x 17.3 centimeters) in size. They may be in black and white or in color. Negatives, transparencies, and X-ray films should not be submitted. Numerical number of the figure and the name of the article should be written on the back of each figure/photograph. Scanned photographs must have 300 or more dpi resolution. The author must identify the top of the figure. These figures and photographs must be cited in the text in consecutive order. Legends for photomicro-graphs should indicate the magnification, internal scale and the method of staining. Photographs of published articles will not be returned. If photographs of patients are used, either they should not be identifiable or the photographs should be accompanied by written permission to use them.

References:
References should be numbered in the order in which they are cited in the text. At the end of the article, the full list of references should give the names and initials of all authors (if there are more than six, only the first six should be given followed by et al). The authors' names are followed by the title of the article; title of the journal, abbreviated according to the style of the Index Medicus (see "List of Journals Indexed," printed yearly in the January issue of Index Medicus); year, volume and page number; e.g.: Hall RR. The healing of tissues by C02 laser. Br J Surg 1971; 58:222-225 (Vancouver style). Reference to books should give the names of editors, place of publication, publisher, year and page numbers. The author must verify the references against the original documents before submitting the article. The Editorial Board may ask authors to submit either soft or hard copy (full length) of all the articles cited in the reference part of the manuscript.

Abstract
Abstract of an original article should be in structured format with the following subheadings:

i. Objective.
ii. Design.
iii. Place & duration of study.
iv. Patients & Methods.
v. Results.
vi. Conclusion.

Four elements should be addressed: why was the study started, what was done, what was found, and what did it mean? Why was the study started is the objective. What was done constitutes the methodology and should include patients or other participants, interventions, and outcome measures. What was found is the results, and what did it mean constitutes the conclusion. Label each section clearly with the appropriate subheadings. Background is not needed in an abstract. The total word count of abstract should be about 250 words. A minimum of 3 Key words as per MeSH (Medical Subject Headings) should be written at the end of abstract. A non structured abstract should be written as case specific statement for case reports with a minimum of three key words.

Introduction.

This section should include the purpose of the article after giving brief literature review strictly related to objective of the study. The rationale for the study or observation should be summarized. Only strictly pertinent references should be cited and the subject should not be extensively reviewed. It is preferable not to cite more than 10 references in this segment. Pertinent use of reference to augment support from literature is warranted which means, not more than 2 to 3 references be used for an observation. Data, methodology or conclusion from the work being reported should not be presented in this section. It should end with a statement of the study objective.

Methods.

Study design and sampling methods should be mentioned. Obsolete terms such as retrospective studies should not be used. The selection of the observational or experimental subjects (patients or experimental animals, including controls) should be described clearly. The methods and the apparatus used should be identified (with the manufacturer's name and address in parentheses), and procedures be described in sufficient detail to allow other workers to reproduce the results. References to established methods should be given, including statistical methods. References and brief descriptions for methods that have been published but are not well-known should be provided; only new or substantially modified methods should be described in detail, giving reasons for using them, and evaluating their limitations. All drugs and chemicals used should be identified precisely, including generic name (s), dose(s), and route(s) of administration.

For statistical analysis, the specific test used should be named, preferably with reference for an uncommon test. Exact p-values and 95% confidence interval (CI) limits must be mentioned instead of only stating greater or less than level of significance. All percentages must be accompanied with actual numbers. SPSS output sheet must be attached with manuscript to clarify results (p-values).

Results.

These should be presented in a logical sequence in the text, tables, and illustrations. All the data in the tables or illustrations should not be repeated in the text; only important observations should be emphasized or summarized with due statement of demographic details. No opinion should be given in this part of the text.

Discussion.

This section should include author's comment on the results, supported with contemporary references, including arguments and analysis of identical work done by other workers. Study limitations should also be mentioned. A summary is not required. PJPS does not publish any acknowledgement to the work done. Any conflict of interest, however, must be mentioned at the end of discussion in a separate heading.

Conclusion.

Conclusion should be provided under separate heading and highlight new aspects arising from the study. It should be in accordance with the objectives. No recommendations are needed under this heading.

Peer Review

Every paper will be read by at least two staff editors of the Editorial Board. The papers selected will then be sent to two external reviewers. If statistical analysis is included, further examination by a staff statistician will be carried out. The staff Bibliographer also examines and authenticates the references.

Assurances.

Authors should provide the following information in appropriate places in the manuscript:

- A statement that the research protocol was approved by the relevant institutional review boards or ethics committees and that all the participants gave written informed consent, if applicable,
- The identity of those who analyzed the data.

Authors of original research articles are not required to submit a formal Financial Disclosure Form at the time of submission. The journal's editor shall request it later, if necessary. However, authors should notify major conflicts of interest or the source of funding in their covering letter.

Conflict of Interest.

Authors of research articles should disclose at the time of revision any financial arrangement they may have with a company whose product is pertinent to the submitted manuscript or with a company making a competing product. Such information will be held in confidence while the paper is under review and will not influence the editorial decision, but if the article is accepted for publication, a disclosure statement will appear with the article. Because the essence of reviews and editorials is selection and interpretation of the literature, the Journal expects that authors of such articles will not have any significant financial interest in a company (or its competitor) that makes a product discussed in the article.

Abbreviations.

Except for units of measurement, the first time an abbreviation appears, it should be preceded by the words for which it stands.

Drug Name.

Generic names should be used. When proprietary brands are used in research, include the brand name and the name of the manufacturer in parentheses after first mentioning of the generic name in the Methods section

Authorship Criteria.

As stated in the Uniform Requirements, credit for authorship requires substantial contributions to (a) the conception and design or analysis and interpretation of the data, (b) the drafting of the article or critical revision for important intellectual content, critical appraisal of findings with literature search and actual write up of manuscript. and c) final approval of the version to be published. Each author must sign a statement attesting that he or she fulfills the authorship criteria of the Uniform Requirements.

PJPS strongly discourages gift authorship. Mere supervision, collection of data, statistical analysis and language correction do not grant authorship rights. Ideally all authors should belong to same department of an institute, except for multi-centre and multi-specialty studies.

The Journal discourages submission of more than one article dealing with related aspects of the same study.

Reprints.

Three copies of the journal will be sent to the corresponding author.

Copyright.

The Journal of Pakistan Journal of Plastic Surgery is the owner of all copyright to any work published by the journal. Authors agree to execute copyright transfer of their Forms–ACP (Authors Certification Proforma) as requested with respect to their contributions accepted by the journal. Material printed in this journal being the copyright of the PJPS, may not be reproduced without the permission of the editors or publisher. Instructions to authors appear on the last page of each issue. Prospective authors should consult these before submitting their articles and other material for publication. The PJPS, accepts only original material for publication with the understanding that except for abstracts, no part of the data has been published or will be submitted for publication elsewhere before appearing in this journal. The Editorial Board makes every effort to ensure the accuracy and authenticity of material printed in the journal. However, conclusions and statements expressed are views of the authors and do not necessarily reflect the opinions of the Editorial Board or the PJPS. Publishing of advertising material does not imply an endorsement by the PJPS.

QADRI HEALTHCO

SILIMED
www.silimed.com.br

New BioDesign Series of Implant

melan:off™ pack

md:peel™
TREATMENTS

Trulife

25 Years of Human Wellness
25th ANNIVERSARY
Silver Jubilee Year
1987-2012

COMPLEMENTARY PRODUCTS FOR ALL AESTHETIC TREATMENTS

SMOOTHING · FILLING · MODELLING · REHYDRATING TO PERFECTION

innosearch

Perfect

Compression Garments
Custom Made & Prefabricated

Head Office:
4/A Mozang Road, Lahore-54000 Pakistan.
Ph: +92-42-37223391-5
Fax: +92-42-37350624

International Office:
Ph: +97 15 52 94 9924

Helpline: 0300 8460 786

Branch Offices:

Abbottabad
Ph: +92-346-957 32 69

Faisalabad
Ph: +92-345-842 87 09

Gujranwala
Ph: +92-321-443 11 42

Karachi
Ph: +92-321-849 47 44

Kohat
Ph: +92-300-915 85 95

Multan
Ph: +92-321-438 06 72

Mardan / Sawat
Ph: +92-323-927 64 46

Mirpur (AJK)
Ph: +92-333-581 82 64

Peshawar
Ph: +92-321-912 73 18

Rawalpindi / Islamabad
Ph: +92-321-443 11 27

Sialkot
Ph: +92-321-957 89 17

Refresh.Renwe.Reveal.....

the new You.

Whether it's cosmetic or reconstructive surgery,
our experienced surgeons will see to it that
your look radiant 24/7.

- ***Plastic&ReconstructiveSurgery***
- ***Cosmetic&AestheticSurgery***
- ***SurgeryoftheHand***