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Contents

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Case Report

Transligamentous variant of the thenar motor branch of the median nerve encountered during carpal tunnel decompression

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Abstract

Carpal tunnel syndrome is the commonest type of entrapment neuropathy in the upper limb. Increased pressure within the carpal tunnel, >32 mmHg, leads to vascular ischaemia of the median nerve causing primarily nocturnal pain and paraesthesia involving the radial 31/2 digits, worsening with wrist flexion, and increased difficulty in fine motor tasks.

Variations in the course of branches of the median nerve particularly its thenar motor branch (TMB) have been extensively studied. Surgical decompression of the carpal tunnel is a commonly performed surgery and awareness of such variations is critical to prevent iatrogenic injury.

Here we present a case of a 35 year who underwent surgical decompression of the carpal tunnel under loupe magnification in a plastic surgery unit. Careful dissection of the hypertrophied muscle over the transverse carpal ligament (TCL) revealed a nerve emerging through the ligament. An ulnar approach employed to divide the TCL and decompress the median nerve confirmed it as the transligamentous variant of the TMB arising from the anterior surface of the median nerve.

Poisel's original classification divided the TMB into extraligmentous, subligamentous and transligamentous variants. Lanz further expanded on this classification. The rare transligamentous course, seen in 1 in 10 people is at highest risk of iatrogenic injury in hand and wrist surgery. Nicknamed the "million-dollar nerve", damage to the TMB is a surgeon's nightmare owing to the high legal costs faced with litigation.

Awareness of and clinical suspicion of such variations along with meticulous surgical technique, with layer by layer dissection, is mandatory to prevent iatrogenic injury

Keywords: transligamentous, thenar motor branch

Introduction

Carpal tunnel syndrome is the commonest type of entrapment neuropathy in the upper limb. Increased pressure within the carpal tunnel, >32 mmHg, leads to vascular ischaemia of the median nerve resulting in a range of symptoms that include nocturnal pain and paraesthesia involving the radial 31/2 digits, particularly worsening with wrist flexion, and increased difficulty in fine motor tasks[1].

Increased pressure within this compartment could be either due to an increase in volume of its contents, or decreased size of the tunnel itself. Causes for increased volume of its components could be primary, due to anatomical abnormalities, or secondary to systemic conditions such as diabetes, rheumatoid arthritis, hypothyroidism, acromegaly and pregnancy[1].

Anatomical variations within the carpal tunnel have been described in relation to nerves, vessels, muscles and tendons[3]. Variations in the course of branches of the median nerve particularly its thenar motor branch have been extensively studied[4]. Surgical decompression of the carpal tunnel is a commonly performed surgery and awareness of such variations is critical to prevent iatrogenic injury[1].

Here we describe an encounter with a transligamentous variant of the thenar motor branch encountered during carpal tunnel decompression.

Case Report

A 35-year-old previously well Sri Lankan female presented to the plastic surgical clinic with pain and tingling along the radial half of the right hand for 2 months' duration. The pain was worse at night and with activities that involved flexion of the wrist, such as driving and cooking. There was recent onset clumsiness with dropping objects due to difficulty in forming a tight grip. There was no associated neck pain or pain radiating along the arms. She was right handed and a doctor by profession.

On examination, she had paresthesia over the radial half of the fingers without involvement of the skin over the thenar eminence. There was no muscle wasting but mild weakness of the abductor pollicis brevis muscle. Tinel's and Phalen's signs were positive. A clinical diagnosis of carpal tunnel syndrome was made. Nerve conduction studies were confirmatory.

Open carpal tunnel decompression was performed using loupe magnification. Upon dissecting through the palmar aponeurosis, hypertrophied muscle was seen arising from the transverse carpal ligament (TCL). Following careful dissection of the muscle, a nerve was seen piercing the TCL and supplying the thenar muscles. Careful division of the TCL depicted its origin from the upper aspect of the median nerve within the carpal tunnel, confirming this as the transligamentous variation of the thenar motor branch of the median nerve Following decompression, she made an uneventful recovery and significant improvement in nocturnal paraesthesia at 1 month.

Discussion

Carpal tunnel syndrome is the commonest type of entrapment neuropathy. Increased pressure within the carpal tunnel in excess of 32mmHg leads to ischaemia and compression of the median nerve within the carpal tunnel [1]. The median nerve, a mixed nerve, traverses the wrist through the carpal tunnel deep to the transverse carpal ligament (TCL) and divides into medial and lateral branches upon exiting the tunnel at the distal border of the TCL. The recurrent thenar motor branch arises from the lateral branch, before giving rise to proper palmar digital nerves. The thenar motor branch (TMB), exclusively supplies the abductor pollicis brevis muscle, and with the ulnar nerve co-innervates the flexor pollicis brevis and opponens pollicis [2,4]. Hence, ischemia and compression of the nerve within the carpal tunnel leads to nocturnal paresthesia over the radial 31/2 fingers and difficulty in fine motor skills[1].

Numerous anatomical variations have been described in literature in relation to the nerves, vessels, muscles and tendons that are components of the carpal tunnel [3]. Particular importance has been placed on variations in the course and branches of the median nerve, of which the TMB is of paramount importance [4]. Yet only the typical extraligamentous type is described in most anatomical text books. Nicknamed the “million-dollar nerve” due to high legal costs faced by surgeons due to litigation caused by accidental injury the nerve during hand and wrist surgery, intimate knowledge of the variations to the TMB is essential armor to a surgeon [6,7].

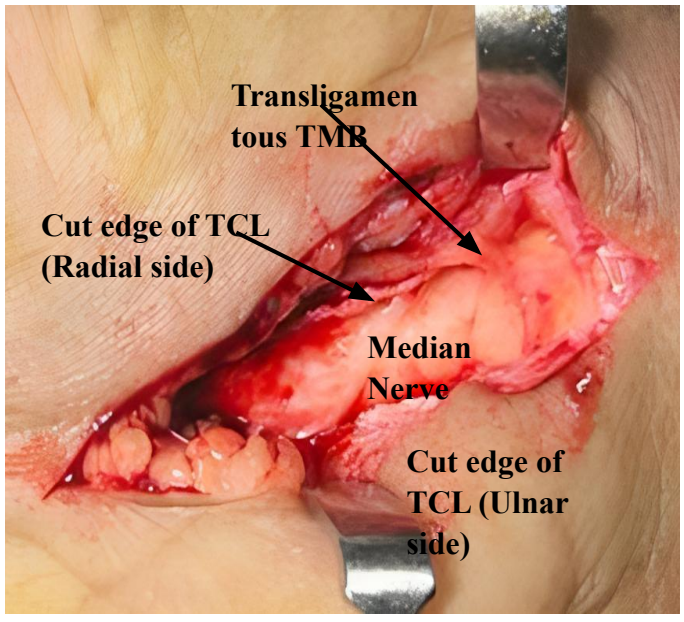
The Poisel classification divided the TMB into 3 groups based on its branching pattern; the commonest extraligamentous (Type I), subligamentous (type II) and transligamentous (type III) [5]. In the extraligamentous type, the TMB arises from the median nerve at the distal end of the TCL, and hooks over its free border before travelling in a retrograde manner to reach the thenar musculature. In the subligamentous type, the TMB arises from the median nerve within the carpal tunnel deep to the TCL, and then enters the thenar in a similar fashion to type 1. In the rarer trans-ligamentous type, the TMB arises within the carpal tunnel, but pierces the TCL to then reach the overlying thenar muscle [5,9].

Lanz expanded Poisel's original classification system, to include variations of the median nerve in the carpal tunnel [8]. He described four groups of variations: variations in the course of the single TMB according to Poisel (type 1), accessory branches of the median nerve at the distal carpal tunnel (type 2), high division of the median nerve (type 3), which Lanz reported to be associated with the presence of a persistent median artery (PMA) running with the bifid median nerve, and accessory branches of the median nerve proximal to the carpal tunnel (type 4)[4,8].

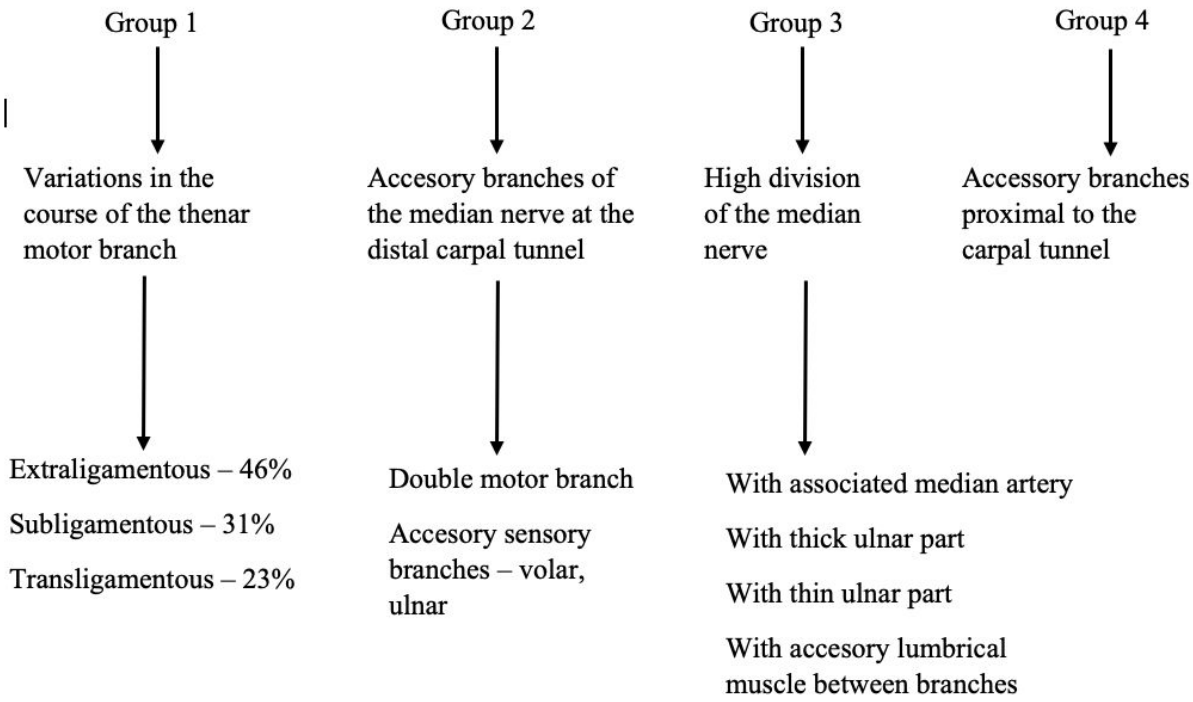
Multiple studies have been conducted to assess anatomical variations of the TMB with results varying depending on the classification system used. A meta-analysis by Henry et al found the extra-ligamentous course of the TMB to be the commonest with a pooled prevalence rate of 75.2%. The sub-ligamentous group was seen more commonly in those undergoing intraoperative procedures that in cadaveric group (24.6% vs 13.5%) which indicate that this variation may be associated with a higher risk of CTS [3,4,9].

Fig 1: The thenar motor branch of the median nerve seen arising from the anterior aspect of the median nerve within the carpal tunnel and piercing the transverse carpal ligament

Fig 2: A closer look at the transligamentous TMB arising from the anterior aspect of the median nerve within the carpal tunnel and piercing the transverse carpal ligament



Summary of Lanz' classficiation of median nerve variations



The prevalence of the transligamentous course varied from 0 to 80% amongst studies with a pooled prevalence rate of 11.3%. Variations in interpretations of nerves that arise outside the TCL but that pierce the oblique fascia of TCL as in fact trans-ligamentous may be a cause for high prevalence in some studies (4). Lanz suggested that the trans-ligamentous course was associated with a higher risk of CTS. The pooled prevalence for ulnar side of branching of the TMB was 2.1% (95% CI: 0.9%- 3.6%), while the pooled prevalence for radial/anteroradial side of branching was 97.9%. The trans-ligamentous variation is at highest risk of iatrogenic injury during CTD followed by the sub-ligamentous counterpart [4,8].

Adding to this complexity, the presence of hypertrophied muscle mixed in with TCL seen in 18.2% of patients should serve as a warning sign to underlying anatomical variations of the TMB, as a transligamentous course was seen in 23.4% of those with hypertrophied muscle as compared to 1.7% of without it. Therefore, an ulnar side approach, with layer by layer dissection of the carpal tunnel is recommended to prevent iatrogenic injury [4,7].

The above case describes an encounter with the transligamentous variation of the TMB seen in roughly 1 in 10 patients undergoing carpal tunnel decompression. It arose from the anterior surface of the nerve. Recognition was hampered by the presence of hypertrophied thenar muscles interspersed with the TCL encountered during carpal tunnel release. Layer by layer dissection under loupe magnification and an ulnar approach aided its timely recognition.

Conclusion

An array of anatomical variations has been described in the carpal tunnel most notably for the TMB of the median nerve. Hypertrophied thenar muscles over the TCL should raise suspicion over the presence of a variant. An ulnar approach to division of the TCL is recommended to minimize the risk of iatrogenic injury.

Declarations

None

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Ethics approval and consent to participate

Not applicable

Consent for publication

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Availability of data and material

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Case Report

Pedicled supraclavicular flap reconstruction of a pharyngeal defect following laryngectomy

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Introduction

Supraclavicular pedicle flap (SCPF) is a fasciocutaneous island flap based on supraclavicular artery and vein. It has been used successfully to reconstruct pharyngeal, oesophageal, tracheotomy defects and skin defects following oncological resections of anterior neck[1,2]. Here we present the case of a patient who underwent SCPF reconstruction of a pharyngeal defect following laryngectomy for laryngeal carcinoma.

Clinical course

A 63-year-old patient diagnosed with laryngeal carcinoma who was initially treated with 6 cycles of radiotherapy, presented with recurrence of carcinoma involving bilateral arytenoids and bilateral piriform fossae. He underwent total laryngectomy along with thyroidectomy, thymectomy and bilaterally paratracheal lymph node dissection and tracheostomy with primary closure of pharynx and anterior neck soft tissue. Histology confirmed moderately differentiated squamous cell carcinoma. Six weeks after laryngectomy he developed a pharyngo-cutaneous fistula. Primary closure of pharyngeal and oesophageal defect over a nasogastric tube was attempted but failed. Ten weeks into laryngectomy he had an approximately 1x 2 cm oesophageal defect and an anterior neck fascio-cutaneous defect of 4 x 5 cm. A fasciocutaneous SCPF was planned to reconstruct the oesophageal and cutaneous defects.

Surgery

Wound debridement and preparation was done in the recipient site. Supraclavicular artery was located using hand held doppler. A 14cm x 5cm fusiform shaped flap was used which extended from proximally supraclavicular fossa (about 2.5 cm lateral to posterior border of sternocleidomastoid clavicular head) to proximal deltoid distally (Figure -2) Flap was raised sub facially from distal to proximal using sharp dissection.

The supraclavicular vascular pedicle was identified and dissected along up to about 3cm distal to its origin. Distal edge refashioning was done and viability confirmed. Flap was rotated and tunnel onto anterior neck. Oesophageal defect was closed separately using absorbable sutures and cutaneous defect was closed in two layers using absorbable sub-dermal and non absorbable skin sutures. Donor site was closed primarily. Total operative time was 105 minutes

Follow up

Initial wound inspection five days after surgery confirmed flap viability. Suture removal was done after two weeks. Patient was followed up for two months postoperatively with successful outcomes. Flap texture and colour matched the surrounding tissue and successfully covered the previous defects with no observable scarring. No complications were observed in donor or recipient sites.

Discussion

Reconstructing neck defects with a successful anatomical, aesthetic and functional outcome can be challenging. Achieving complete anatomical closure, skin texture and colour matching while preserving full range of neck function is important [3].

PCF is a common major complication following laryngectomy [1]. Primary repair or delayed secondary repair has been associated with higher complication and poor success rates with previous irradiation being an independent risk factor[4], hence reducing local flap options. Use of vascularized flaps has demonstrated successful outcomes [4]. Different flaps have been described in the closure of these including pectoralis major flaps (PMF) and radial forearm free flaps (RFF)[3]. Supraclavicular flap is one of these faciocutaneous flaps.

SCPF is a pedicled fasciocutaneous, rotational flap based on supraclavicular artery (SCA) and veins which can be used successfully in reconstruction of head and neck defects [1]. It is based on SCA, which is a branch of transverse cervical artery (TCA) arising from the thyrocervical trunk (TCT) which can be easily identified as a 1-1.5mm pedicle in the triangle bound by external jugular vein posterolaterally, posterior border of sternocleidomastoid anteromedially and the clavicle inferiorly [4]. Although commonly used dimensions are 6-8cm x 8-10 cm [1] , large flaps of 20 -25cm of length can be used[4]. Width is limited by the ability to close donor site primarily which is about 8cm. Pedicle can either be incorporated into the exterior neck or can be tunnelled after de-epithelialisation[4]. SCPF doesn't require post-operative monitoring except routine inspection.

No randomised trials comparing SCPF with other similar flaps could be found. However single-center reviews , retrospective reviews articles and case studies have denoted SCPF as a highly favourable option for head and neck reconstruction.
It's a thin, hairless flap with similar colour and texture to neck recipient site [2] providing better cosmetic outcome than PMF and RFF which are bulky and cause distortion in donor site[3]. It is easy to perform and operative time is short[4]. Additionally Emerick, Herr et al reports successful use of SCPF as a patch graft reconstruction of pharyngeal wall and pharyngeal interposition graft after oncological resections. SCPF pedicle is outside the surgical field of cervical lymphadenectomy and has shown favourable results in prior irradiated, vessel depleted necks recipient sites[1,4,5]It's simplicity, being a single surgery reconstruction and shorter operative time allow its use in anaesthetically complicated patients. Ability of primary closure of donor site is also an advantage.
Complications reported in SCPF are distal tip ischaemia, pharyngeal fistulas and leaks, referred shoulder pain during eating, wound dehiscence and scarring [2]. Rate of total flap loss is low (4%) [4]. Donor site scarring and serum formation are also reported[3]. Most studies report SCPF having similar or low complication rates compared to other alternatives[1,3,4].

Previous surgery involving TCT or TAC , irradiation over the donor site and prior extensive neck dissections are considered relative contra-indications for this procedure[1].

Learning points
SCPF is a pedicled rotational fasciocutaneous flap used in head and neck reconstructions. It's a simple procedure with a short operative time and can be used in previously irradiated recipient sites. It provides complete anatomical closure with cosmetically favourable outcomes and minimal complications.

Figure 2: Completely healed oesophageal and fasciocutaneous defect after two weeks

Declarations
None

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Consent for publication
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Availability of data and material
All data generated or analyzed during this study are included in this published article.

Competing interests
The authors declare that they have no competing interests.

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Figure 1: Oesophageal and fasciocutaneous defect and flap design before surgery.

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Case Series

Novel concept for non-healing ischial decubitus ulcers with histological analysis of two cases

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Abstract

Decubitus ulcers are often related to sustained pressure on soft tissues trapped between two hard surfaces. Currently, this concept has been challenged due to better understanding of the differences in pathophysiology of ulcer progression. This article will focus on the anatomy of Ischial region, physiological adaptation and pathophysiology of the pressure ulcers. Finally, describes possible mechanisms of poor-healing of those ulcers using two case vignettes.

Introduction

Ischial region anatomy

Ischial tuberosity has evolved with humans to play a significant role in posture, stability and bipedal mobility. It is a central structure that act as a fulcrum for muscles and ligaments. While the medial segment provides direct support to the axial load of the body, rest of the surface provides attachment for Semitendinosus long head of biceps femoris tendon complex. Semi membranous is attached towards the lateral margin. The medial lip is covered with the sacro-tuberous ligament[1].

This ischial complex is covered by gluteus maximus on standing position. The same muscle moves away with the seated position in majority of male and female bodies. Bulk tissue thickness varies from few millimetres to few centimetres at the apex of the tuberosity. This makes the soft tissue under the tuberosity to be particularly vulnerable for ischaemia. Ischial bursa provides the gliding surface to the tuberosity[1].

Ischial bursa is a synovial type of sack that is similar to the lining of a joint. This provides a gliding surface for the buttock skin: i.e. to glide over the tuberosity. Magnetic resonance imaging shows that although the superficial surface of the bursa is not firmly adhered, the deep surface of the synovium is firmly adherent to the bone [1].

Pathophysiology of pressure injury to skin

Aetiology of pressure injury is a combination of four mechanical and circulatory factors [2]

1. tissue deformation leading to direct cellular injury
2. Occluded capillaries causing ischaemia
3. Tissue injury due to reperfusion
4. Lymphatic dysfunction causing accumulation of toxins.

These mechanisms are mostly applicable to deeper tissues. Superficial lesions are mostly related to friction damage to skin. In contrast to earlier understanding of grade 1 pressure ulcers even with the intact epidermis dermal capillary, smaller veins may show stasis, extraversation and fat necrosis. Deeper structures are also vulnerable for pressure and shear induced smaller vessel rupture and blockage. These were evident on several histological studies done on pressure ulcers[4]. However, the earlier animal model studies revealed the friction alone will not cause ischeamia[3]. These elaborated electron and light microscopic studies describe intra-cellular changes and typical pressure induced ishaemia to tissue architecture. This has been postulated to be a precursor to invasive infections that further complicates the injury. During the latter part of the ulcer development healing starts at the periphery. The pressure ulcers show several different pathways in the clinical course. This is especially true for patients who has improved nursing care and offloading of the pressure on the area. Converse is true for patients with poor nutrition, sepsis, or local infection. We believe the clinical course of the wound is related to site since local complications of each type varies.

The commonest presentation of ischial pressure ulcer in our series is the chronic discharging small wound with a fibrotic rim. The non healing nature of these cases was analysed using ulcer histology.

Case details

We selected 2 patient who underwent V-Y advancement flap repair for ischia pressure ulcers. Both were male patients aged 58 and 47 years, with paraplegia due to previous vertebral fractures. Apart from flap reconstruction, we performed En block excision of ischial ulcer up to the periosteum of the ischium. In both patients' histology showed Evidence of oedematous granulation tissue near the keratinized squamous epithelium (Which denotes the adjacent area of the skin margin) and polypoid contours resembling synovial tissue (Figure 1 and figure 2). There were no evidence of invasive malignancy or granuloma formation.

Discussion

The ischial ulcer histology indicates thick fibrosis and synovial membrane covering the ulcer. The fibrosis is explained by the wound contraction led by myofibroblast theory. Synovial membrane lining the bursa has proliferated to line the cavity[4]. This could be a response to counteract the pressure and the friction on ulcer cavity wall. There is evidence that this is related to several trigger mechanisms; pressure, increased local temperature, prolong inflammation, that causes genetic alterations. These altered genetic expressions can lead to a sustained local response of proliferative tendencies of the bursa synovium. These exact markers are not yet identified. Reasons for non-closure of this unnamed pathological connection between a synovium lined cavity and skin could be a combination of pressure, contact inhibition of skin, wound edge hyper keratosis or the synovial fluid discharge.

Although pressure effect on the pressure ulcer healing has been studied the extent of contact inhibition influence on non-closure is poorly understood in ischial ulcers. Wound edge hyper keratosis could be similar to callus formation in neuropathic foot. Discharging wounds are known to keep cavity connections open. The synovial like fluid that is produced by the ulcer could very well be an additional factor for non-healing nature of these ischial pressure ulcers. The amount of granulation tissue is minimal compared with any other common ulcer. This may be a distinct feature of these open bursa type lesions on the ischial tuberosities. The normal superficial bursa synovium produces very small quantities of hyaluronan. There are no reports of contents of the ischial pressure ulcer discharge. The proliferation of these ulcer synovial cells is different to rheumatoid arthritis since the invasive features are not seen on histology[5]. The finer cellular features and the matrix character has not been compared with rheumatoid tissue up to now.

Figure 5: Typical appearance of an ischial syconium. Note the smaller fibrotic opening and fleshy inside

Figure 6: V to Y flap design to advance once the en bloc excision is done.

Conclusion

Ischial pressure ulcer can behave similar to an open bursa. Once stable, they can persist for long durations. Proliferative synovium and skin keratosis remain key pathologies preventing resolution in stable ischial pressure ulcers. The term ulcer may not be the most suitable term since it shows minimal granulation on the base of the ulcer. Hence, we propose the term ischial syconia.

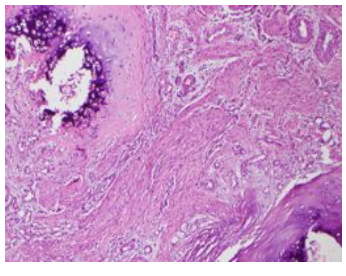

Figure 1: Patient A, The slide shows synovial tissue and a foci of new bone formation

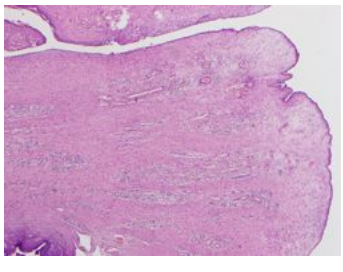

Figure 2: Patient A, The slide shows typical fleshy synovial proliferation with no epithelium

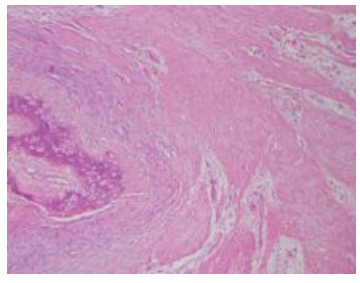

Figure 3: Patient B, The slide shows a cartilage element within the synovial stroma

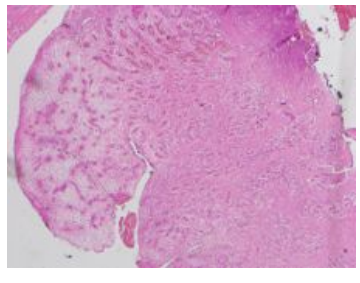

Figure 4: Patient B, The slide shows a ploypoidal segment of the fleshy synovial folds seen inside the ishial pressure syconia

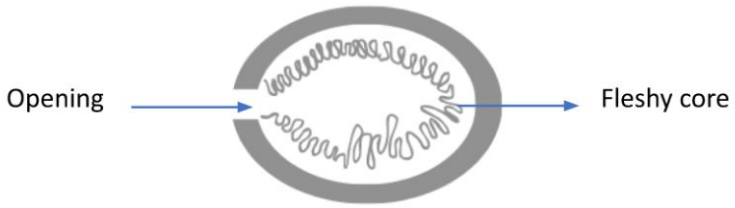

Figure 7: Cross-section of a Ficus fruit

Declarations
None

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Consent for publication
Informed written consent for publication and accompanying images was obtained from the patients prior to collecting information.

Availability of data and material
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Competing interests
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Observational Study

Clinical outcomes of double fascicular nerve transfer for restoring elbow flexion in brachial plexus injuries

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Introduction

Brachial plexus injuries, though infrequent, exert a profound impact, afflicting only 1% of polytrauma patients [1]. These injuries culminate in compromised motor function and sensation within the affected upper extremity. Predominantly affecting young males, they constitute up to 90% of reported cases [2]. The repercussions of traumatic brachial plexus injuries are far-reaching, inflicting substantial physical disability, psychological distress, and economic hardships on the youthful population. Motor vehicle accidents account for nearly 70% of these cases [3].

Brachial plexus injuries can be classified into upper trunk, lower trunk, isolated roots and trunks, and pan-brachial plexus injuries. Patients with upper arm-type brachial plexus injuries (specifically, involving C5-C6 and C5-C6-C7) demonstrate deficits in shoulder elevation, abduction, external rotation, and elbow flexion functions. Additionally, those with a C7 root injury may experience additional impairments in elbow, wrist, and hand extension functions. The evolution of reconstructive techniques now offers viable solutions, encompassing nerve repair, nerve grafting, nerve transfer, muscle/tendon transfer, and free-functioning muscle transfer, thereby presenting avenues for restoring functionality in upper arm brachial plexus injuries.

Crucial considerations in the realm of surgical management entail a profound understanding of injury patterns, strategic timing of surgical intervention, prioritization of functional recovery, and adept management of patient expectations.

Initially, a conservative approach is adopted for all patients unless root avulsion or distal brachial plexus disruption has been confirmed. Patients with an intact brachial plexus undergo a three-month period of observation to monitor signs of regeneration and muscle reinnervation. Following this period, a re-evaluation, complemented by repeat EMG studies, is conducted. In cases where spontaneous recovery is absent, surgery is advocated at the three-month post-injury juncture [4].

A plethora of options exist for restoring elbow flexion, with the optimal approach contingent upon the availability of donor motor nerves. Pioneered by Oberlin et al. in 1994, the transfer of a single ulnar nerve fascicle to the biceps branch of the musculocutaneous nerve emerged as an early technique for restoring elbow flexion.

Building upon this foundation, Mackinnon et al. in 2003 advocated for the reinnervation of both the biceps and brachialis muscles, thereby augmenting the potential for robust elbow flexion recovery [5, 6]. The primary aim of this study is to assess the clinical outcome of elbow function subsequent to modified double fascicular Oberlin transfer, a procedure involving the transfer of ulnar and median nerve fascicles to the musculocutaneous nerve. This study focuses on patients with upper brachial plexus injuries predominantly involving the C5-C6 nerve root.

Methods

A retrospective observational study was conducted on patients who underwent Modified Oberlin transfer for upper brachial plexus injuries at Army Hospital Colombo 05, Sri Lanka, from January 2019 to September 2023. Five consecutive patients who underwent Oberlin transfer at Army Hospital Narahenpita were selected for the study. Electrophysiological studies and MRI of the thoracic outlet were routinely performed to identify root avulsions and establish whether the lesions were pre-ganglionic or post-ganglionic. All patients underwent the Oberlin procedure by a single surgeon approximately 4 months from the date of injury. Patients were placed in a supine position with the abducted and externally rotated arm. An incision was made over the medial aspect of the arm, and the deep fascia was divided. The muscular cutaneous nerve, median nerve, and ulnar nerve were identified. The motor branch of the muscular cutaneous nerve to the biceps and brachialis was identified and divided. A motor branch of the ulnar nerve was identified using a nerve stimulator, and a nerve fascicle was divided by intraneural neurolysis. The biceps was re-innervated with the ulnar nerve fascicle using 8-0 proline, and the median nerve fascicle was separated by intraneural neurolysis and reinnervated to the brachialis motor branch using 8-0 proline. Direct coaptation of the nerve fascicles was performed without the need for nerve grafts, and no nerve glue was applied. The deep fascia was sutured with 5-0 monocryl, and the skin was closed with 5-0 monocryl.

A broad arm sling was used postoperatively, and patients were discharged within 72 hours of the procedure. They were advised to perform both active and passive wrist and finger movements starting from post-op day 1, and elbow function was evaluated during weekly clinic visits. Electrical nerve stimulation was initiated at 3 weeks post-op, and physiotherapy was arranged. Elbow flexion power was assessed using the Medical Research Council (MRC) scale 6 and 8 months postoperatively.

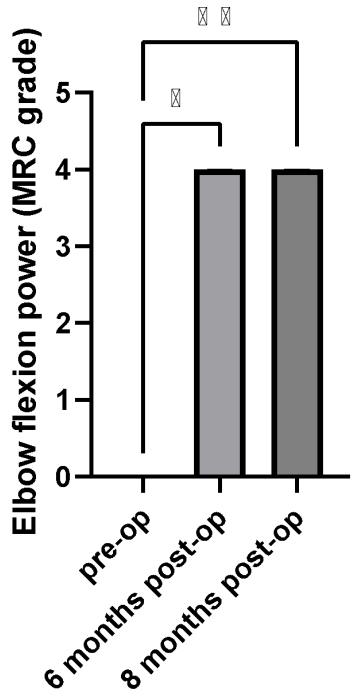

Figure 1: Functional outcomes of double fascicular nerve transfer for restoring elbow flexion in brachial plexus injuries. Median elbow flexion power was tested preoperatively, 6 months after the surgery, and 8 months after the surgery. Error bars are interquartile range. *p<.05, *p<.01

Results

The study encompassed five patients, comprising four males aged 22, 35, 32, and 28, and one female aged 65. Notably, all male patients had sustained injuries in road traffic accidents, whereas the female patient's brachial plexus injury was a consequence of the excision of a schwannoma in the left posterior triangle. All patients presented with predominant upper brachial plexus injuries, exhibiting a pre-surgical biceps power rating of 0. Among these, three patients had injuries on the right side, while the remaining two sustained injuries on the left side. At the 6-month post-surgery, all patients demonstrated functional elbow flexion power surpassing a score of 3. Subsequently, the median elbow flexion power at 8 months post-surgery was 4 (q1=3, q3=4) (Figure 1). Kruskal-Wallis test with post-hoc Dunn’s multiple comparisons indicated a statistically significant improvement of elbow flexion power postoperatively (H(2)=11.08, p=.001) (Figure 1). Furthermore, none of the patients exhibited any sensory or motor deficits within the ulnar or median territories subsequent to the surgical intervention.

Discussion

The current study underscores the effectiveness of modified double fascicular Oberlin transfer in addressing upper brachial plexus injuries predominantly involving the C5-C6 nerve root. Our results demonstrate an excellent improvement of elbow flexion power within 6 months postoperatively. Despite these promising findings, it is crucial to acknowledge certain limitations. The study's sample size remains modest, warranting further investigations with larger cohorts. Additionally, while the study assesses the immediate postoperative outcomes, a longitudinal evaluation would offer valuable insights into the durability of the functional improvements.

Conclusion

In conclusion, the transfer of expendable motor fascicles from the ulnar and median nerves proves to be a highly effective method for reinnervating both the biceps and brachialis muscles, culminating in robust elbow flexion. Notably, this approach offers an additional biomechanical advantage by reinvigorating the brachialis muscle, a pivotal contributor to elbow flexion. The synergistic activation of these key muscles underscores the exceptional functional restoration achieved through this surgical intervention. This technique not only optimizes motor performance but also holds significant promise for enhancing the overall quality of life for individuals with upper brachial plexus injuries.

Declarations

None

Consent for publication

Informed written consent for publication and accompanying images was obtained from the patients prior to collecting information.

Availability of data and material

All data generated or analyzed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests.

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Case Report

Large epidermal cyst in the ischiorectal fossa: A rare cause for a perineal lump

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Introduction

Epidermal cysts are a rare cause of ischiorectal fossa lesions and only a few cases are reported in the literature. They can grow asymptomatically into significant sizes before becoming externally apparent. History of trauma and previous surgery in the perineum including episiotomy could be recognized as aetiological factors. We report a case of a large epidermal cyst in the right ischiorectal fossa in a 68-year-old female.

Case Presentation

A 68-year-old female patient presented with an insidious onset, gradually increasing, painless swelling in the right perineal and buttock region for six months duration. She denied any symptoms of bowel or anal pathology. There was no history of any perianal trauma or previous surgery except for an episiotomy on the right side at her first child delivery at the age of 33 years. Her medical history was unremarkable. Clinical examination revealed a non-tender, well-demarcated, firm, slightly lobulated, subcutaneous lump in the right perianal region. Vaginal and digital rectal examinations revealed a palpable lump abutting on their walls from the right side. MRI revealed a well-circumscribed unilocular thin-rimmed 10.2x7.7x5x4 cm-sized cystic lesion in the right ischiorectal fossa suggestive of an epidermal cyst (Figure 1). The rectum and the vagina were contralaterally displaced. The patient was operated under general anaesthesia in the prone position with a pillow under the groin area to closely resemble the prone-jack knife position. A curved incision was made keeping the convexity away from the anus and the cyst was dissected off around its well-demarcated plane of dissection. Medially it was abutting on the external anal sphincter, which was identified and carefully preserved. The wound was closed in layers over a suction drain and the skin was sutured with intradermal sutures (Figure 2). An occlusive dressing was applied to prevent post-operative faecal contamination. The patient had an uneventful recovery and the histology of the specimen revealed an epidermal cyst measuring 12x8x6 cm without evidence of malignancy. Follow-up after one year was unremarkable without evidence of recurrence or any scar complication.

Discussion and Conclusions

Epidermal cysts are squamous epithelium-lined keratin-filled cystic lesions. They can be either congenital (from an ectodermal remnant) or acquired secondary to trauma (accidental or following a surgical procedure) or due to sebaceous duct obstruction. They commonly occur in the face, neck, extremities and scalp.

Epidermal cysts in the ischiorectal fossa are uncommon with only a few case reports published in literature. The common differential diagnoses for lesions in the ischiorectal fossa include abscesses, lipoma, neurofibroma, tailgut cysts, rectal duplication cysts, Gartner duct cysts, Bartholin cysts and rarely carcinomas such as extramucosal anal adenocarcinomas [1].

Epidermal cysts in the ischiorectal fossa are mostly present as slowly enlarging asymptomatic swellings. They can grow into larger sizes usually displacing the adjacent structures; the anus and the vagina in females and may extend to the pelvic space [2]. The largest reported epidermal cyst in the ischiorectal fossa measured 15x10 cm and the largest reported epidermal cyst anywhere measured 17.8x13.18 cm and the latter was located in the gluteal region [3][4].

Theoretically, the possible etiological factor for the cyst in this location in our patient is the previous episiotomy. However, it is important to note that it has taken a long time (35 years) for the appearance of the lump.

MRI is the preferred method of imaging to differentiate from other lesions and to delineate the soft tissue anatomy. They appear as unilocular cysts and the contents are hyperintense on T2-weighted images. T1 weighted mages will show low to high signal intensity, depending on the relative amount of sebaceous or protinaceous material. Their thin wall could enhance with contrast (Figure 1). Malignancy needs to be ruled out in the presence of septa, thick enhancing rim or post-contrast images showing indistinct enhancement of adjacent soft tissues. Although a CT scan can localize the lesion in the ischiorectal fossa, differentiation and characterization are almost impossible and non-specific [1].

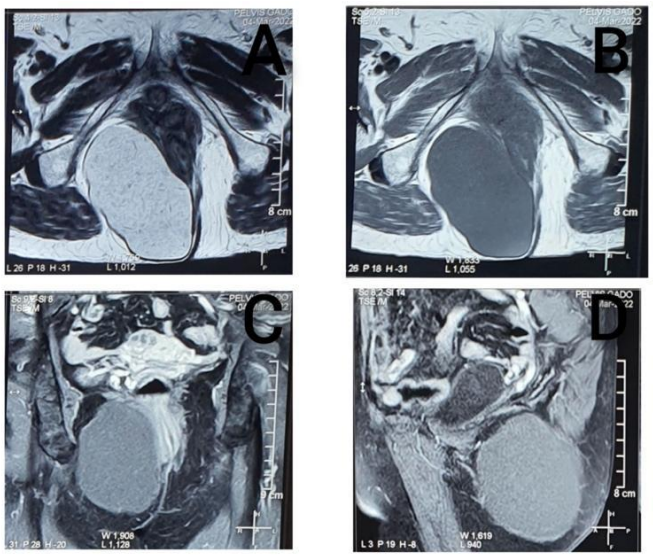

Figure 1: Selected cuts from the MRI

A - T2 axial image showing hyperintense cyst displacing the vagina and the rectum contralaterally

B, C, D - T1 images showing hypointense cyst with a rim having low signal intensity signal (B- Axial pre-contrast, C- coronal post-contrast fat-saturated, D – sagittal post-contrast fat-saturated)

Figure 2: Clinical images

A- Externally visible lump

B. The patient was positioned in the prone position and the incision marked

C- Cyst excised

D- Layered closure with intradermal sutures to skin over a suction drain

Other than the large cyst having the possibility of giving rise to symptoms due to displacing and narrowing down of adjacent structures they can be complicated either by rupture or infection. There is a potential risk for malignant transformation [5].

Surgical excision is the management of choice. Planning of the incision and meticulous dissection to prevent any rupture and spillage of the contents and especially to avoid inadvertent damage to the external anal sphincter are essential. Care should be taken to avoid faecal contamination to prevent wound infection during the postoperative period. In this case, we utilized a nonlinear skin incision keeping its convexity away from the anal orifice to prevent any damage to the external anal sphincter and for the convenience of managing the postoperative period avoiding faecal contamination of the wound.

Learning points

1. Epidermal cysts are a rare cause of lesions in the ischiorectal fossa and they can asymptomatically grow into large sizes until they are externally apparent.
2. Planning of the incision and meticulous dissection to avoid inadvertent injury to adjacent structures are essential to avoid surgical complications.

Declarations

None

Ethics approval and consent to participate

Not applicable

Consent for publication

Informed written consent for publication and accompanying images was obtained from the patients prior to collecting information.

Availability of data and material

All data generated or analyzed during this study are included in this published article.

Competing interests

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Retrospective Study

Post operative monitoring in microsurgery: Comparing glucose measurement with clinical parameters

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Abstract

Traditionally clinical monitoring of microvascular surgery in the postoperative period requires a clinician to monitor the flap by various clinical parameters. The objective of this study was to evaluate post operative blood glucose monitoring within flap and compare it with traditional clinical parameters and use as a tool that can help in early detection of flap complication. We performed 38 free flaps, 7 critical revascularisation and 9 replantations. Blood glucose was checked at the normal finger tip of the patient and simultaneously flap was scratched or replanted limb or digits were pricked and blood sugar noted. Blood glucose monitoring was performed at regular interval. There were 20 complications out of which 7 underwent minor intervention and 13 underwent major intervention. Eleven interventions resulted in normalisation of tissue perfusion, with a salvage rate of 55%. Glucose levels were significantly correlated to other clinical parameters. Sugar levels were significantly low in the complication group, either its absolute level or its difference to normal digit glucose level. We conclude that the measurement of free tissue capillary glucose level may be used as method of diagnosis of complication, but it is not superior to clinical evaluation by an experienced professional.

Keywords: Free flap, Replantations, Random blood sugar (RBS), Flap monitoring, Microvascular.

Introduction

Free-tissue transfer and replantation or revascularization are accepted part of the armamentarium of reconstructive surgeons with quoted success rates around 95% [1]. The success of these surgeries is dependent on the continuous arterial inflow and venous outflow through patent microvascular anastomoses until neovascularization is established by peripheral ingrowth of capillaries. Traditionally, monitoring of free flaps and replantations in the postoperative period requires a clinician to monitor the flap or replanted parts by various parameters [2]. Blood glucose measurement from flap or replanted tissues establishes a simple method that can be used widely to decrease the flap loss rate after free tissue transfers and replantations [3].

Methods

This study was conducted at the department of Plastic Surgery at a tertiary care hospital, which is also a resident training institute in India. It was done from January 2021 to June 2022 over a period of 18 months. All the patient undergoing microvascular surgery, either free tissue transfer or replantation or revascularizations were included in the study. Patients with history of diabetes, history of chronic steroids intake and patients not consenting for the study were excluded.

Any patient who underwent surgery which resulted in a considerable defect e.g. surgery for malignancy, which required reconstruction by free tissue transfer which needed the microvascular anastomosis or the patients with amputation of any part of limb or organ which came under indication for replantation or revascularization were recruited in the study after taking due consent. We had three groups of patients in this study:

1.Free tissue transfer
2.Critical revascularization
3.Replantation

The patients were admitted and worked up for the surgery. All history, clinical examination and investigations were done accordingly. All patients underwent at least one arterial and one venous anastomosis as was required for every microsurgical free flap or replant operation.

In the postoperative patient were observed for vitals, urine output, flap perfusion clinically, hourly for the first twelve hours and then twice daily over the next five days. The patient was observed initially in post-op recovery for initial 1-2 hours till he/she was fully stable hemodynamically. Then the patient was shifted to high dependency unit (HDU) for further monitoring. The replanted part/ free transferred tissue were monitored at regular interval with all parameters described below.

The sugar level was measured by needle prick with 26G needle is done in flap and finger. Glucose level is measured with Free Style Optium Neo instant instruments which utilize very small quantity of blood (≈10 µl).

In case of deranged value/clinical situation which were indicated to intervene early, the patient was shifted to the operation theatre immediately for the intervention. In this situation the intervention performed was noted and the tissue was monitored further. These patients were followed up serially, initially hourly and then twice a day.

Results

A total of 54 patients were included in the study. Among the groups, Group 1 included 38 patients (25 men and 13 females) ranging from 10 to 74 years (Mean-37.84), Group 2 had 7 patients ranging from 10 to 52 years (Mean-27), and Group 3 had 9 patients ranging from 10 to 52 years (Mean- 33.44).

Out of 54 patients, 34 (63%) patient did not require any intervention and the tissue survived without any complications. A total of complications occurred in 20 patients overall including all the groups.

The complications which occurred in the form of congestion or occlusion or hematoma was 11 in Group 1(28%) out of which venous was more common i.e., 9 (81% of total complications) and arterial 2(19%). In group 2, there were 3 complications (42%) out of which 2 were venous and 1 was arterial, and in group 3 there were 6(66%) complications out of which 4 were venous and 2 were arterial. Venous complication occurred later (Mean 19.4 hrs) than arterial (Mean 2.8 hrs). All flap complication patients underwent intervention either minor in the form of rewarming, Leech therapy, clot removal or major in the form of re-exploration and revision of anastomoses. Out of total 20 complications 7(35%) underwent minor intervention and 13 (65%) underwent major intervention. The overall salvaged flap after intervention was 11(55%). Where in Free flaps it was 7 out of 11(63%); In revascularization group it was 2 out of 3(66%); and in Replantation group it was 2 out of 6 complications (33%).

The process of salvage was started on clinical basis at once there were sign of complication on clinical grounds. The sugar level difference was significant in those cases at the time of decision making. In two of the cases where clinical parameters were borderline the sugar level difference helped us to decide for intervention.

Discussion

The salvage of congested flap depends upon early detection of congestion and timely intervention / re-exploration. The decision to inform the patient for a repeat surgery remains critical, and needs to be backed by objective data.

For monitoring microvascular free tissue transfers, a variety of methods have been described, including a physical assessment of the flap (colour, capillary refill time, temperature and turgor), laser Doppler flowmetry, hand-held acoustic Doppler, non-invasive ultrasound Doppler, implantable micro Doppler system, near infra-red spectroscopy and microdialysis.

In the present study, we compared the blood sugar level of the flap to other commonly used parameters. We analysed whether the falling sugar level as compared to normal finger correlates with the complication occurring in the flap. The study showed that falling blood glucose level strongly correlates with other traditional parameters which can early detect the failing flap or replant to intervene so that to prevent it to enter into non-salvageable stage.

In the present study, we included all microvascular surgery including free flaps and replantation and critical revascularisation, whereas other studies like Deviprasad et al studied only on free flaps. Bashir et al studied free flaps as well as pedicled flaps. A case report by Kazufumi et al describes successful lip replantation with was monitored with blood glucose level and intervention with leech therapy once low sugar level (<40 mg/dl) was detected and flap was salvaged[7].

	1 Hour	2 Hours	3 Hours	6 Hours	12 Hours	24 Hours	48 Hours	72 Hours
Replanted part/Flap	110	118	136	122	132	126	122	111
Normal limb	215	166	182	175	160	153	139	107
Clinical parameters								
Colour of flap	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Turgor of flap	Good	Good	Good	Good	Good	Good	Good	Good
Temperature	Warm	Warm	Warm	Warm	Warm	Warm	Warm	Warm
Capillary refill time	<3 sec	<3 sec	<3 sec	<3 sec	<3 sec	<3 sec	<3 sec	<3 sec
Colour of blood on scratch/pin prick	Bright red	Bright red	Bright red	Bright red	Bright red	Bright red	Bright red	Bright red

Table 1: RBS monitoring

RBS (mg/dl) at Flap site	Complication group(n=20) {median(IQR)}	No complication group(n=34) {median(IQR)}	P value (Mann Whitney U test)	P value of difference
At 1 hour	90.00(74.74 to 119.75	96.50(73.00 to 122.25)	0.507	0.485
At 2 hour	95.50(71.50 to 135.00)	114.50(89.50 to 136.50)	0.107	0.014
At 3 hour	81.00(46.75 to 124.25)	114.5(101.25 to 144.25)	0.005	0.007
At 6 hour	68.00(30.00 to 107.00)	107.0(91.75 to 135.0)	0.006	0.051
At 12 hour	68.00(0.00 to 126.00)	108.00(94.00 to 132.25)	0.027	0.001
At 24 hour	62.00(0.00 to 109.00)	107.50(87.0 to 124.50)	0.001	0.004
At 48 hour	52.50(0.00 to 123.00)	108.50(93.25 to 133.25)	0.004	0.000
At 72 hour	0.00(0.00 to 68.00)	106.00(97.75 to 124.00)	0.000	0.000

Table 2: Comparison of RBS in flap site between the group with complication and group without complications

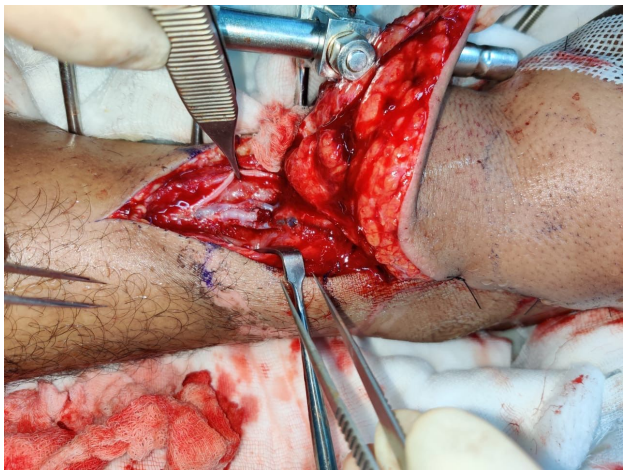

Figure 1: Flap salvage

Figure 2: Glucose monitoring

In the present study, we monitored blood sugar level at 1,2,3,6,12,24,48 and 72 hrs, whereas in other studies (Deviprasad et al and Bashir et al), the evaluation was performed at 0,6,12,24 and 48 hrs[5,6]. The present study analysed blood glucose level from fingertip and not the venous blood glucose level and compared with that of flap and the ratio is calculated for better results. The glucose level along with other parameters was also taken for flap monitoring. The differences in glucose level of flap/replanted part and normal fingertip was compared accordingly.

According to Hara et al. (2011), who reported the test for flap monitoring in 2011, the cutoff value for diagnosing venous bleeding is a blood glucose level of 62 mg/dl in the flap[4]. But this alone reading does not give proper information for re exploration. In some cases, surgeons have found that flaps with a blood glucose level of 62 mg/dl survived, whereas in other cases, flaps necrosed.

The sugar level of flap or replanted part drops in case there are vascular complications. More reliable is the continuous falling sugar level and the difference in sugar level as compared to normal finger sugar level. However, these parameters solely should not be considered as criteria for early intervention. The falling sugar level and very low level as compared to normal level should be additional criteria along with other traditional clinical parameters.

In other previous studies like Hera et al, Bashir et al and Chaudhary et al, pedicled and free flaps were studied altogether whereas in the present study we included only free tissue transfer and replantation which was done through microvascular anastomosis. We sought to specifically assess the trend of flap glucose level where microvascular anastomosis was performed.

Advantages

- Complication in the veins can be detected at an early stage when blood glucose levels fall below the normal range in compromised flaps.
- The blood glucose level within the flap monitoring method reported in the research is simple and may be carried out by residents, nursing staff, or even patients' attendants.
- This is a very cost-effective solution.
- Tissue transfers using a tiny skin paddle or intraoral flaps, when other typical procedures make monitoring glucose levels impossible, might benefit from using the flap's blood glucose level as a marker.

Disadvantages

- The use of this procedure is restricted in situations when vascular integrity has been compromised since in such situations, sufficient blood may not be collected or there may not be any flow at all to assess the glucose level in a pinprick test.
- Moreover, since blood glucose levels in diabetes patients often fluctuate at both higher and lower values more than they do in non-diabetics, it is uncertain if blood glucose levels obtained from diabetic patients can be used for flap monitoring. Therefore, it could be necessary to modify the blood glucose readings received from diabetes individuals, and further study is needed on this subject.
- This approach is not suitable for buried tissue transplantation or exclusively muscle flap instances.
- To yet, this method has not been able to define a cut-off value, sensitivity, or specificity for the diagnosis of early flap congestion
- The glucometer devices have error of +/- 15% to venous blood glucose level so the value can be erroneous.
- Blood which is taken from the flap or replanted part may be mixed with tissue fluid or saliva in case of flap in oral cavity.

Further possibilities

This study included free flaps as well as critical revascularizations and replantation of limb or digits as well. Larger sample size in each group would substantiate the results. Other biochemical parameters like lactate level can also be included in post operative monitoring criteria to bring out the easier methods for early detection of failing flaps or replantation.

Conclusion

Flap capillary glucose monitoring is an easy, accessible and cost-effective method, which helps in early detection of flap congestion, even before flap discoloration occurs. A falling blood glucose level after microvascular anatomosis strongly correlates with other clinical parameters. The incorporation of blood glucose measurement in addition to clinical monitoring, aids in early detection and possible reduction of postoperative complications due to venous thrombosis.

Declarations

None

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Consent for publication

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Availability of data and material

All data generated or analyzed during this study are included in this published article.

Competing interests

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Non-surgical management of metacarpal bone fractures in Army Hospital Sri Lanka

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Abstract

Metacarpal fractures comprise between 18–44% of all hand fractures. Metacarpals except thumb account for around 88% of all metacarpal fractures, with the little finger most commonly involved. The majority of metacarpal fractures are isolated injuries, which are simple, closed, and stable. While many metacarpal fractures do well non-surgically, there is a lack of literature and persistent controversy to guide the managing surgeon on the best treatment option.

A retrospective observational study was conducted at the Army Hospital from 2023 January to 2024 January assessing 45 patients. They were aged between 20-60 years and presented with metacarpal bone shaft fractures except the thumb considering acceptable angulation, shortening and minimal rotation in fractures. They were managed non-surgically with ulnar gutter and radial gutter splints with buddy strapping for minimally up to 6 weeks. They were followed up to 6 weeks minimally.

These patients were reviewed in 2 weeks and 6 weeks with follow-up x-rays and the clinical condition was assessed. As a general principle, early mobilization should be considered when deciding the method of splinting.

In conclusion out of the 45 patients we analysed majority were male, and the mean age was 24.6 years. The most common mechanism of injury was accidental falls (28 patients, 62%). Immediately after splint removal, 90% had a full range of finger movement and 90% were pain-free. Few required occupational therapy. Five patients experienced minor complications, non-limiting extensor lag and minimal residual pain. Non-surgical management with a thermoplastic splint and buddy strapping is an effective, economical treatment for metacarpal fractures.

Keywords: Non-surgical management, Hand, metacarpal bone, Fractures

Declarations
None

Consent for publication
Informed written consent for publication and accompanying images was obtained from the patients prior to collecting information.

Availability of data and material
All data generated or analyzed during this study are included in this published article.

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Case Report

Ulnar nerve compression at Guyon's canal by an ulnar artery aneurysm

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Introduction

Ulnar nerve entrapment at the Guyon's canal is a rare compression neuropathy of which the exact incidence and epidemiology are not clearly documented. Guyon's canal is the fibro osseous tunnel at the wrist formed by pisiform bone medially, hook of hamate laterally, while transverse carpal ligament forms the floor, and the roof is formed by the volar carpal ligament. Both the ulnar artery and ulnar nerve run through the canal and the nerve divides into superficial sensory and deep motor branches. Clinical manifestations vary according to the site of the compression. The treatment principles of Guyon's canal syndrome are that of other compression neuropathies. Potential structures causing the compression should be thought about before decompressive surgery

Case Presentation

We report a case of Guyon's canal syndrome due to ulnar artery aneurysm subsequent to repetitive occupational trauma.

A 35-year-old male presented with numbness over little and ulnar border of the middle finger for about 3 months period. Our patient is a mechanic working in a factory and the very first symptom he noticed was pain over the hypothenar eminence when using the screwdriver, about 1 year prior to the admission. The pain gradually increased over time both in intensity and frequency, but mostly at work. There was no visible abnormality of the hand, observed by the patient.

Over the last 3 months he had developed numbness over the little and ring fingers and had accidental burns over the finger, following contact with hot metallic parts of machines. There was clumsiness in performing fine activities like fixing a screw. Mixing rice and food with the right hand was affected over the last month prior to admission.

On clinical examination, there was reduced sensation over the little and ulnar half of the ring finger and distal palm on the ulnar aspect. There was no demonstrable wasting of intrinsic muscles, but adduction and abduction of the fingers were weaker compared to the normal hand. Froment sign was weakly positive. There was tenderness over the hypothenar region with positive Tinel sign.

Plain radiography of the wrist was unremarkable. Ultrasound scan demonstrated a vascular malformation within the thenar eminence, and the nerve conduction test confirmed compression of the ulnar nerve at the wrist.

The Allen test was performed before the operation and the palmar arches integrity was confirmed. At the surgical exploration opening the Guyon's canal, a pulsatile, encapsulated lesion arising from the ulnar artery was found (Fig 1,2). This was about 2 x 2 cm and pressing on the ulnar nerve before the division of the deep branch. Ulnar nerve was dissected off the lesion and the cystic lump was excised ligating two ends of the ulnar artery (Fig 3). Hand perfusion was assessed and confirmed prior to ligation of the ulnar artery with micro clamps applied proximal to the lesion on the artery.

Histology of the lesion revealed a cystically dilated vessel with a thinned-out muscular wall and a flattened endothelial lining. The lumen showed blood and fibrin, and the vessel wall showed myxoid change.

Discussion

Ulnar nerve entrapment at the Guyon's canal is less common than at the elbow. Clinical manifestation varies with the level and the duration of the compression. Aetiologically, the majority of ulnar nerve compression at Guyon's canal is idiopathic, identifiable lesions include ganglion cysts, hook of hamate fractures, tumours like lipoma, various vascular malformations, and abnormally located muscles[1,2,3]. Patient discussed in this case report clearly indicates repetitive trauma to the hypothenar area due to the frequent use of screwdrivers and other tools at his occupation. This could have initiated the formation of aneurysmal dilatation of the ulnar artery. Hence, our case could be a hypothenar hammer syndrome in which the ulnar nerve compression has occurred secondary to ulnar artery aneurysm at the Guyon's canal.

Nerve conduction studies are used to confirm the clinical suspicion of ulnar nerve compression, and to identify the site of the compression. Nerve conduction studies are essential to evaluate concomitant carpal tunnel syndrome, C8, T1 radiculopathy and also peripheral neuropathy.

Basic imaging modality used in our case was Ultrasound scan that can visualise vascular anomalies in the region. Best imaging modality to evaluate a compressing lesion would be the MRI but in our case which was not done. Plain radiograph and USS scan are the essential radiological investigations and CECT and /or MRI should be done in selected cases to identify specific structural causes for the compressions[4,5].

In this case ulnar artery was not reconstructed as the perfusion of the hand was not affected following ligation of the artery. After the operation pain was relieved within 2- 3 days time. Hand movements and clumsiness of the hand movements were improved at 3 months follow up and, he regained near normal sensation with good protective sensation. At one year follow up his hand was near normal and continue to do his usual work. Correct diagnosis and timely surgical decompression and abnormal structure pressing on the ulnar nerve should be removed appropriately. Undue delay should be minimised to preserve the complex function of the intrinsic muscles of the hand[6].

Figure 1: Intraoperative view of the ulnar artery aneurysm

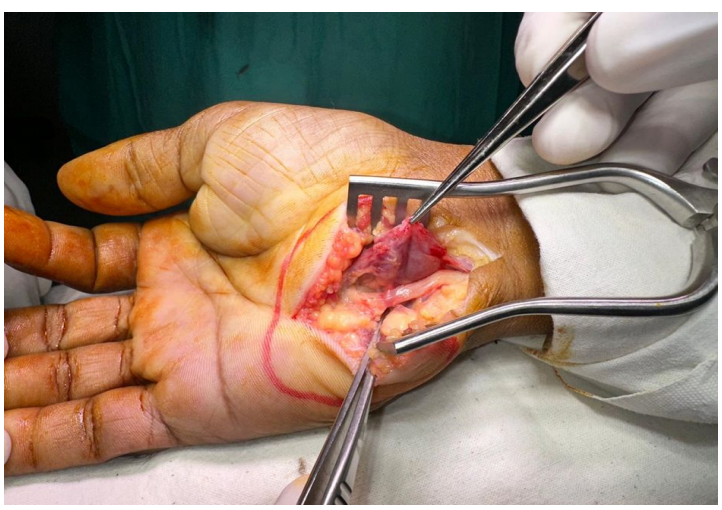

Figure 2: Ulnar artery aneurysm pressing on the ulnar nerve

Figure 3: Compressed segment of the ulnar nerve after excision of the aneurysm

Declarations
None

Consent for publication
Informed written consent for publication and accompanying images was obtained from the patients prior to collecting information.

Availability of data and material
All data generated or analyzed during this study are included in this published article.

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Case Report

Scalp Angiosarcoma: A Case Report

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Introduction

Angiosarcoma is an aggressive malignancy with a poor prognosis. The 10-year survival rates for scalp angiosarcoma range from 13.8% in cases with metastatic disease to a more favourable 53.6% when the tumour is localized[1]. Primarily affecting the face and scalp, angiosarcoma most commonly occurs in elderly individuals[2]. Its presentation is often deceptive, initially appearing as a benign lesion. However, it typically follows a highly aggressive course, with a significant risk of metastasis via lymphatic or hematogenous pathways. Early-stage treatment relies heavily on surgical excision, which remains the cornerstone of management. One of the most prevalent challenges, however, is the recurrence of the tumour following surgical intervention. But one of the most common problems is tumour recurrence following surgery[3].

Case Presentation

A 47-year-old male presented to the dermatology clinic with multiple asymptomatic scalp lesions in the left fronto-parietal region, persisting for 3 months. (20x18cm) On examination, an indurated erythematous nodular plaque with scaly satellite lesions were identified. A biopsy revealed a poorly demarcated dermal lesion characterized by numerous irregularly shaped, anastomosing vascular channels lined by atypical endothelial cells, consistent with a diagnosis of cutaneous angiosarcoma. Immunohistochemistry confirmed the diagnosis.

The patient was subsequently admitted and referred to the plastic surgery team. Given the widespread nature of the angiosarcoma, with multifocal lesions distributed across the scalp, a wide local excision followed by skin grafting was planned. The staging CT scan did not reveal any evidence of metastatic disease.

One and a half months after the diagnosis, the patient underwent wide local excision of the scalp, with intraoperative frozen sections used to assess margin clearance. An initial resection margin of 2 cm was taken, but frozen section analysis revealed a positive deep margin. As a result, an additional 2 cm of tissue was resected which was also positive. Due to the unavailability of a frozen section facility after hours, a further 1 cm margin was excised and sent for histopathological examination. The resulting skin defect was covered with a split-thickness skin graft. Unfortunately, the final resection margin was still positive on the histopathology report.

The patient was initially scheduled for re-resection, but the procedure was delayed due to MRSA colonization of the wound. After successful decolonization, the re-resection was performed approximately one month after the initial intervention.

During the re-resection, the outer table of the skull was burred, and an additional 2 cm margin was excised. Intraoperative frozen section analysis confirmed clear margins, with no residual tumour deposits. However, due to time constraints in the operating theatre, the definitive reconstruction was postponed.

The final reconstruction was subsequently carried out. Another 0.5 cm margin was removed, and the outer table of the skull was reburred. The defect was then covered with a latissimus dorsi flap, and a split-thickness skin graft. During the procedure, the right superficial temporal artery and vein were exposed, and the latissimus dorsi muscle flap was raised. The artery and vein of the flap were anastomosed with the superficial temporal artery and vein. The exposed bone was covered with the muscle flap and secured using 2-0 Vicryl sutures. A meshed split-thickness skin graft was placed on the muscle flap.

The patient experienced an uneventful recovery, with no complications such as hematoma, infection, or flap failure. On postoperative day 7, the skin graft was inspected, showing 95% graft take. The patient was subsequently discharged on postoperative day 8. A follow-up appointment was scheduled for one-week post-discharge, with additional monthly follow-ups planned. The patient also expressed a willingness to use a hair wig moving forward the surgical outcome was aesthetically acceptable.

Discussion

Angiosarcoma arises from the differentiation of vascular or lymphatic endothelial cells, constituting around 1%–2% of all soft tissue sarcomas[4]. Among head and neck soft tissue sarcomas, it exhibits the highest propensity for lymph node metastasis, with distant metastases occurring in up to 50% of cases.

The lungs are the most frequent site of metastasis, followed by the liver[5]. Clinically, angiosarcoma often begins as a bluish discolouration, but its presentation can vary widely, ranging from asymptomatic lesions to those showing necrosis and crust formation, often accompanied by bleeding[6]

A definitive diagnosis may be delayed in cases with nonspecific symptoms, as conservative management is often pursued without a biopsy. This delay in diagnosis and subsequent treatment can significantly reduce survival rates. Immunohistochemistry plays a critical role in both the diagnosis and the differential diagnosis of angiosarcoma, offering valuable insights for early detection and treatment planning[6].

Various treatment approaches are available, including radiotherapy, chemotherapy, cytokine therapy, and wide local excision. Radiotherapy has been shown to improve survival rates, particularly in patients with multifocal lesions. While the efficacy of chemotherapy remains a subject of debate, paclitaxel has emerged as a promising advancement in therapeutic strategies. Cytokine therapy, involving intralesional interferon alpha-2b and interleukin-2 combined with surface radiotherapy, has been explored as an alternative to surgery. For early-stage tumours, wide local excision remains the preferred treatment. In this case, given the prompt diagnosis, wide local excision was the most suitable option[7].

Figure 1: Preoperative

Figure 2: Intraoperative

Figure 3: Postoperative appearance

Given the aggressive nature of angiosarcoma, wide local excision often results in large defects with exposed bone. Several reconstructive techniques are available, including skin grafts, free flaps and the use of skin substitutes[8]. Gudewer et al reported successful scalp reconstruction using a free muscle flap and skin graft following angiosarcoma resection, with both functional and aesthetic outcomes being satisfactory[9].
Skin grafting is a feasible option for reconstruction following wide local excision, but it should only be performed once granulation tissue has sufficiently developed at the surgical site. However, the formation of granulation tissue can be time-consuming, increasing the risk of surgical site infection during this period. Patients often express dissatisfaction with this approach, as it necessitates prolonged exposure to an open wound, leading to extended hospital stays.

Dermal alternatives offer another viable option for reconstruction. Skin substitutes are a diverse group of biological, synthetic, or biosynthetic materials designed to provide either temporary or permanent coverage for open skin wounds. Ideally, these substitutes mimic the composition and function of natural skin or facilitate autologous regenerative healing when applied to a wound. Examples include Integra® (LifeScience Corp., Plainsboro, NJ, USA) and NovoSorb® BTM (Biodegradable Temporizing Matrix, PolyNovo Biomaterials Pty Ltd). However, NovoSorb® BTM is currently unavailable in Sri Lanka, and the use of Integra® is impractical for larger skin defects due to its high cost.

Free tissue transfer flaps play a crucial role in such reconstructions. Flaps can be muscle flaps or fasciocutaneous flaps. Fasciocutaneous flaps have the disadvantage of donor site morbidity due to their large size in this case. And the appearance can be bulky. Muscle flaps are a better option for this patient. Studies recommend the latissimus dorsi flap, anterolateral thigh (ALT) flap, and radial forearm flap as primary reconstructive options. The ALT flap has gained popularity due to its low donor site morbidity and ease of harvest, while the radial forearm flap's major limitation is the restricted size of the available tissue at the donor site[8].

The latissimus dorsi flap is often favoured for reconstruction due to its large size, making it an ideal candidate. Additionally, its vascular pedicles offer compatible calibres and sufficient length, particularly when compared to the superficial temporal vessels. In this case, a split-thickness skin graft was applied over the muscle flap, as studies suggest faster secondary healing occurs when a muscle flap supports the graft[10].

Some studies have identified donor-site morbidity as a disadvantage of latissimus dorsi muscle transfer, particularly noting reduced shoulder function due to extensive muscle resection. This is most evident in the early postoperative period, with patients experiencing weakened shoulder strength, especially during extension, internal rotation, and adduction movements[11].

Conclusion

Scalp angiosarcomas is a rare highly aggressive cutaneous malignancy with poor prognosis. Wide local excision is the preferred option for early-stage tumors. Lattismus dorsi flap is a good reconstructive option due to its large size and vascular compatibility. The split-thickness skin graft performed over the muscle flap has better healing with a cosmetically appealing result.

Declarations

None

Consent for publication

Informed written consent for publication and accompanying images was obtained from the patients prior to collecting information.

Availability of data and material

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