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The reverse lateral arm fascial flap in interposition arthroplasty for elbow ankylosis

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ABSTRACT

Interposition arthroplasty for elbow ankylosis is still a practiced surgical procedure in many nations as elbow replacement surgery is yet to be fully established worldwide. For many decades up until today various interposition materials have been used and the jury is still out on the search for the ideal one. We therefore report the surgical technique of the use of the reverse lateral arm fascial flap, which is based on the interosseous recurrent artery, as interposition material following joint release of ankylosed elbow. We recommend that interposition elbow arthroplasty should be done using the reverse lateral arm fascial flap which is easily accessible through the same surgical incision, vascularized and more durable and functional; offers shorter operation time and less donor site morbidity. The use of this material for interposition arthroplasty of the elbow had not been previously reported.

Keywords: Elbow, Ankylosis, Interposition arthroplasty, Reverse lateral arm fascial flap

INTRODUCTION

Elbow ankylosis remains a common presentation in the outpatient department of National Orthopaedic Hospital Enugu (NOHE), Nigeria. This is because a lot of patients with elbow injury visit the Traditional Bone Setters (TBS) first with consequent mismanagement before eventually presenting in our hospital. These patients therefore present at the outpatient department with elbow ankylosis which in most instances will require surgical extirpation of the tissues causing the ankylosis whether bone or fibrous tissue and subsequent interposition with a durable material to prevent joint fusion and allow for good elbow function. Commonly used for this is the fascia lata from the lower limb of the patient. An interposition material is usually used to prevent a recurrence of ankylosis after surgery in the elbow tissue with the propensity to form abnormal bones (myositis ossificans) following trauma. Elbow replacement surgery is yet to be established in Nigeria and perhaps in other developing countries, and most patients requiring

replacement may not be able to afford the cost. It becomes imperative to find a method of managing elbow ankylosis with good functional outcomes and less morbidity at a cheaper cost. We therefore describe the surgical technique of using the reverse lateral arm fascial flap in elbow interposition arthroplasty for elbow ankylosis.

Anatomy

The lateral arm flap is a composite flap overlying the posteriolateral aspect of the upper arm based on the posterior radial collateral artery (PRCA). The lateral arm fascial flap (LAFF) is the fascia-only flap of the lateral arm flap and has been described by $Yousif^2$ and Summers³. The area of fascial perfusion via the PRCA extends posteriorly over the triceps muscle and tendon, anteriorly to the septum between the biceps and brachialis muscles, distally past the elbow and proximally just over the distal portion of the deltoid; and areas up to 9×12 cm have been used clinically. The PRCA ultimately

anastomoses with the interosseous recurrent artery (IRA) near the lateral epicondyle.3 This IRA is a branch of the ulna artery⁴ and this PRCA-IRA flow-through system allows a reverse flow lateral upper arm flap to be used around the elbow⁴. This is the basis for the reverse lateral arm fascial flap (RLAFF) used in this report. It is the LAFF with a distal pedicle based on the interosseous recurrent artery (IRA). The flap is raised from the pathological limb and used to interpose the same regional elbow joint. Summer et al³ postulated that the dimension of the flap depends on the average number and mean length of perforators which have been described as 5.5 and 7.13 cm respectively. They also identified a dominant posterior branch about 10 cm cephalad to the epicondyle in all cadaver specimens studied. The extent of the RLAFF that is harvested depends on the surface area of the distal end of the humerus; and basically in most individuals the posterolateral aspect of the fascia over the triceps extending to but not including the intermuscular septum will suffice.

METHODS

Pre operatively the length of the needed fascial flap is estimated by measuring the distance between the lateral border of the capitellium and the medial border of the trochlear (distal articular surface of the humerus) on a recent radiograph of the elbow. The usual 20% magnification offers the additional length for the attachment of the flap to the capsule on the medial side.

Under general anaesthesia and using an upper arm tourniquet a posterior midline skin incision is made on the lower half of the arm. The fascia over the triceps posterolaterally is elevated and separated from the skin from proximal to distal, Figure 1. The fascia is raised from the edge of the posterior midline incision laterally towards the lateral intermuscular septum. It is divided from a proximal to distal direction with inferior based pedicle, Figure 2 and laterally at the border of the intermuscular septum avoiding the PRCA-IRA in the septum. The septum with its vessels and the anterolateral aspect of the fascia are not included unless a wider breadth of the RLAFF is needed.

Once raised, the flap is protected under the skin on its base. The ulna nerve is exposed and protected and the elbow joint accessed through a V-Y plasty of the triceps aponeurosis and cleared of fibrous and bony tissues. V-Y triceplasty is done for patients with ankylosis in extension so that flexion can be achieved by lengthening the triceps otherwise the joint can be accessed laterally or medially. Following excision of bone blocks or fibrous tissues, and achieving full arc of motion of the joint, the fascial flap is laid over the humeral articular surface and sutured to joint capsule/surrounding tissues with a delayed absorbable suture, Figure 3. The flap is rotated and advanced to achieve this. It is pertinent to ensure that the base of the flap is not twisted to avoid damage to the

vessels. The wound is closed in layers over a drain if necessary.



Figure 1: Reverse lateral arm fascia.



Figure 2: Reverse lateral arm fascial flap with a distal pedicle based on the interroseous recurrent artery.



Figure 3: Fascia anchored over the distal humerus.

DISCUSSION

Elbow interposition arthroplasty has been done with different materials of biological and artificial nature; still there is no agreement on the ideal interposition material to be used.

The RLAFF is nourished by septal perforators of the PRCA which in turn obtains its blood supply from the IRA via a flow-through anastomotic system. ⁴⁻⁶ We utilize only the posterior portion of the RLAFF as the size is adequate to cover the distal humerus. It can be extended anteriorly if a larger surface area is to be covered. The flap forms a gliding surface for the elbow joint. It is vascularized and thus survives better even in the presence

of joint infections; and will aid antibiotic delivery to the region. Other benefits of this flap are that it averts the need for a distant flap, like the fascia lata, and free flaps, thereby reducing the incidence of donor site morbidity and decreasing operation and anaesthesia time. With this flap, fibrosis and necrosis seen in unvascularized flaps and non biologic materials are likely to be averted. It is thus more durable. The RLAFF is not bulky. It is smooth surfaced allowing the bony end at the joint to glide freely. A large size can be harvested without the problem of wound closure.

The only similar work to ours was a case report by Vancabeke et al in which a free flap of the lateral arm fasciocutaneous flap from the contralateral arm was used in severe post traumatic ankylosis of the elbow. In it the fascial part of the flap was interposed in the elbow joint as a free flap. Akpuaka et al reported the use of the ipsilateral radial recurrent fasciocutaneous flap for interposition in patients with elbow ankylosis. In that case the surgical time is increased as dipilation of the flap has to be done first before raising it, and sometimes the resultant defect is grafted with split skin which contributes to donor site morbidity.

A lot of work has been reported on the use of various materials as interposition material for elbow arthroplasty; such as skin, cellophane sheets, fascia lata, triceps flap, dura matar, latissimus dorsi free flap, anconeus, J-K membrane, gelfoam and tensor fascia lata. 9-15

As far as we know the use of the RLAFF as an interposition flap for the elbow ankylosis has not been reported.

CONCLUSION

The report of the numerous different materials for elbow interposition arthroplasty clearly shows that the search for an ideal interposition material is still ongoing. We therefore recommend the use of the reverse lateral arm fascial flap as an interposition biologic material for elbow ankylosis. This flap is biological, vascularized, and functional and does not require a separate incision to raise, therefore reducing donor site morbidity and operation time.

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