

## Forequarter Amputation at Muhimbili Orthopaedic Institute: indications and Outcome.

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**Amputation through the scapulo-thoracic articulations is a radical surgical procedure. Although it is rarely performed, it remains a valuable surgical option for malignancy and severe injuries around the shoulder joint. In this review we present five cases of Fore Quarter Amputation done at Muhimbili Orthopaedic Institute between 2006 – 2010 with emphasis on the indication, outcome and its significance in developing countries.**

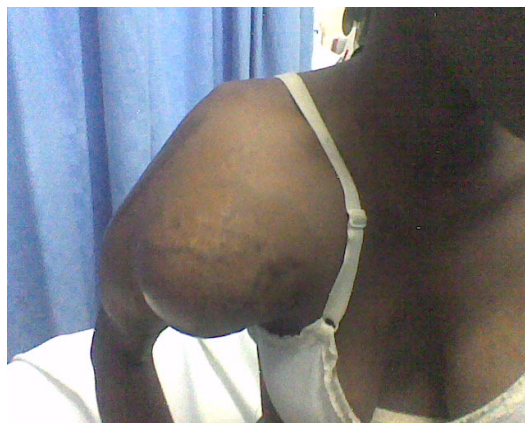
### Introduction

The first forequarter amputation is credited to Ralph Cumming a French army surgeon who is said to have performed the procedure in 1808<sup>1</sup>. Forequarter amputation (FQA) remains a very rare procedure as less than 3% of traumatic amputations of the upper limb are estimated to occur at this level<sup>2</sup>. It entails the removal of the entire upper extremity and shoulder girdle, including the scapula and clavicle. Forequarter amputation has been used as a surgical procedure of choice for high grade sarcomas of the shoulder girdle particularly osteosarcomas of the proximal humerus and scapula<sup>3,4,5</sup>. With the increase in traumatic severe injuries, it is also indicated for unsalvageable injuries around the shoulder joint<sup>6</sup>.

Five patients who underwent forequarter amputation at Muhimbili Orthopaedic Institute are presented. Three of the patients were because of malignancy and two because of severe injuries around the shoulder joint.

### Case 1

A 23 year old female presented with a four year history of progressive swelling of the right shoulder joint associated with pain and restricted range of movements. X-ray revealed a lytic lesion involving the neck and head of humerus. Histology was reported as a fibrosarcoma. She declines a shoulder disarticulation but eventually agreed to palliative FQA three years later where the tumor was so advance (Figure 1).



**Figure 1.** showing a mass involving the Rt shoulder

### Case 2

A 56 year old male patient presented with a two year history of gradual painful swelling of the left shoulder joint, with restricted of range of motion (Figures 2). The x-rays revealed an extensive destructive lesion affecting the scapula, clavicle and proximal humerus and head. The histological diagnosis was a chondrosarcoma. Despite the extensive local extent of the tumor, the patient was offered and accepted a palliative forequarter amputation which was done successfully (Figure 3).



**Figure 2.** shows extent of the tumour



**Figure 3.** Two weeks post forequarter amputation

### ***Case 3***

This was a 20 year old woman who presented with gradual onset of shoulder swelling, ulceration and pain of unknown duration (Figures 4). X-rays showed a destructive bone forming lesion suggestive of an osteosarcoma which was confirmed histological(Figure 5). She was also offered and accepted palliative forequarter amputation which was done successfully (Figure 6).



**Figure 4.** showing a Fungative Mass over the Shoulder joint



**Figure 5.** Proximal Humerous and Shoulder Joint Osteosarcoma Radiograph



**Figure 6.** Five weeks post Surgery

#### **Case 4:**

A 20 year old polytrauma male patient presented six hours post occupational trauma, with severe open injury to the right shoulder joint and haemorrhagic shock. Injuries consisted of partial disarticulation of the right shoulder, open right pneumothorax and closed fracture of right radius and ulna. The injury also extended to the neck exposing the Sternoclavicular joint (SCJ) and acromio-clavicular joint (ACJ). The subclavian vessels were severed and the brachial plexus avulsed. In view of these injuries, emergency forequarter amputation was done. However, the patient died 5 hours post-surgery.

#### **Case 5:**

The fifth and our last patient was 30 year old male who had a motor vehicle crash, leading to traumatic partial disarticulation of the right shoulder joint, ipsilateral open comminuted fracture of the scapula, subcutaneous emphysema, open haemopneumothorax and segmental fracture of right clavicle (Figures 9 & 10). After resuscitation further examination under general anaesthesia revealed that the axillary vessels were severed and the brachial plexus avulsed. A forequarter amputation was then performed and the patient recovered fully (Figure. 7).



**Figure 7.** Preoperative pictures showing the extent of injuries around the shoulder joint



**Figure 8.** 48hrs post forequarter amputation

### Discussion:

Malignant tumours of the shoulder girdle are usually more difficult to manage than those which occur more distally thus they have a poorer prognosis<sup>7,8</sup>. Until 1970's most of the tumours around the shoulder girdle were treated by forequarter amputation. However, with the advance in adjuvant and neo-adjuvant chemotherapy approximately 90-95% of tumours around the shoulder joint are now treated with Limb Salvage Procedures (LSP), making forequarter amputation even rarer<sup>4,9,10</sup>. However, in developing countries more challenges are faced when managing patients with shoulder girdle malignancies. Firstly, adjuvant and neo-adjuvant chemotherapeutic drugs are usually not universally available. Secondly, patient usually present late as exemplified in the presented three patients. This not only makes surgical tumor clearance difficult but also makes limb salvage procedures extremely challenging and difficult if not impossible even when expertise is available. Under these circumstances, forequarter amputation may be the only option for treatment of patients with shoulder girdle malignancies in developing countries.

All the three patients with shoulder girdle malignancies presented with locally advanced malignancies, the reasons being non-acceptance of amputation, late presentation and diagnosis which is still common in many developing countries. Under these circumstances FQA were done only as a palliative procedure, although its role as a palliative treatment remains controversial<sup>11</sup>. Therefore, if patients with shoulder girdle malignancies do present early, FQA could be used as a curative procedure in developing countries where other treatment options may not be available. This is despite the relatively poor overall 5 years survival reported for shoulder girdle malignancies treated palliatively surgically<sup>3,11,12,13</sup>. However despite such poor results forequarter amputations have been justified because they give pain relief and allowed some independence<sup>3,13</sup>. All the three presented patients underwent post surgical radiation therapy although FQA was done as a palliative procedure.

Developing countries have seen an almost epidemic increase in various injuries especially those involving road traffic crashes<sup>14, 15</sup>. This increase has also been associated with increasing severity of the injuries. Severe injuries around the shoulder joint including traumatic forequarter amputations are rare, mutilating and life threatening. However, those who survive the initial trauma can still be saved. Hang et al has noted that factors which may lead to survival following this injury include rapid transportation, prompt and effective resuscitation including treatment of shock and adequate surgical management<sup>6</sup>. Unfortunately the above are many times deficient in developing countries<sup>16</sup>. Both patients were received after six hours following injury in state of haemorrhagic shock signifying that initial resuscitation has not been effective.

Although recent advances in vascular surgery has made re-establishment of blood to severely injured limbs possible, in many cases for injuries around the shoulder joint sometimes is not feasible even when expertise and facilities are available<sup>17, 18</sup>. Both the presented patients had severe traumatic amputation of the shoulder joint with extensive injuries extending to the chest wall, injuries to the

axillary and subclavian vessels, avulsion of brachial plexus and haemopneumothorax. These injuries made forequarter amputation the only treatment option as a life saving procedure.

Although our patients were successfully resuscitated and stabilized before surgery one of the patients, died five hours post surgery probably due to the effects of irreversible shock.

The disfigurement following forequarter amputation has been said to lead to considerable psychological distress in some patients <sup>4</sup>. This plus the fact that there is no effective artificial prosthesis has made some patients reluctant to accept FQA. Although one of female patient initially refused shoulder disarticulation due to anticipated disfigurement, none of our patients has exhibited such psychological distress and all were grateful for the surgery.

## Conclusion

Although forequarter amputation is a rare and uncommon procedure it remains an important surgical procedure for some shoulder pathologies as shown in the five presented cases. For those with malignancy around the shoulder girdle it may be the only treatment option in developing countries. For patients presenting with severe injuries around the shoulder, forequarter amputation may be life saving. Because of the above reasons it is recommended that orthopaedic surgeons and general surgeons in developing countries become aware of this procedure.

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