EXPERIENCE WITH TREATMENT OF CLAVICLE FRACTURES AT AN AFRICAN TERTIARY REFERRAL HOSPITAL

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ABSTRACT

Background: **Clavicle fractures are common with the middle third being most frequently involved. Treatment of displaced fractures is controversial with both non-operative and operative management being advocated for.**

Objectives: **To determine age and gender specific incidence, treatment practices and associated complications of clavicle fractures, and whether these are procedure specific, at Aga Khan University Hospital, Nairobi (AKUH, N).**

Design: **A retrospective chart audit.**

Methods: **The study was conducted in patients with radiologically confirmed clavicle fractures at the AKUH, N. Data were grouped on the basis of age, sex, location of fracture and treatment modality and presented as frequencies and percentages.**

Results: **A total of 51 patients were included in the study. The male to female ratio was 3:1, with the modal age group being 30 -34 years. The middle third of the clavicle was the most commonly involved (63%), followed by the lateral (35%) and medial third (2%). Most fractures were managed non-operatively. Of the patients treated non-operatively 82% had a good outcome with no complications. Of patients treated operatively 75% had a good outcome with no complications, 17% patients required a second operation with one developing osteomyelitis and the other had failed fixation of the clavicle, and one other patient complained of pain.**

Conclusion: **Although operative treatment is associated with early mobilization and more rigid stability it may have higher complication rates and therefore should not be used routinely.**

INTRODUCTION

Fractures of the clavicle are common injuries representing about 2 - 4% of all adult fractures (1-3). Males are more often affected than females with the peak incidence in males being less than 30 years (4). Various classifications of clavicle fractures exist including the Allman, Neer, Craig and Edinburgh classifications (5-7). The commonly used Allman classification classifies clavicle fractures into medial, middle and lateral third (5). Fractures of the middle third are the commonest (60 – 80%) followed by fractures of the lateral third (25 – 30 %). Medial third fractures are rare accounting for only 2% of the total (8). The local trend of clavicular fractures is unknown. The treatment of clavicle fractures is controversial with views of a "traditionalist" non operative school of thought as opposed to primary operative intervention (9,10). Although primary operative management has been associated with better union rates and functional outcome and is cost effective, conservative management has also been strongly advocated for (9, 10). Complications of clavicle fractures are varied with non-union, which may be associated with pain and a clicking sensation on movement, being reported as the commonest (11 - 13). However, other studies done on clavicular fractures have failed to report any non–union (14). Other reported complications include mal- union, weakness, restriction of shoulder movement, thoracic outlet syndrome, subclavian vein compression, neurologic symptoms and cosmetic deformity (15 - 19). The aim of the present study was to determine age and gender specific incidence, treatment practices and associated complications of clavicle fractures, and whether these are procedure specific, at Aga Khan University Hospital, Nairobi (AKUH, N).

Materials and Methods

Study design: The study was a retrospective chart audit.

Study group: Patients with radiological confirmed clavicle fractures treated at the AKUH, N in a two year period between 30th June 2009 and 1st July 2011 were included in the study. No patient who satisfied the criteria was excluded on the basis of age, sex or co morbidity.

Data collection: Data collection was done by the use of a researcher filled questionnaire. Records were accessed from the medical records department at AKUH,N.

Data grouping: The data obtained was classified on the basis of gender and age groups. The age groups were 5 year clusters from 0 – 4 years to 75 – 79 years. Fracture site was classified on the basis of location according to the Allman Classification to middle, lateral and medial thirds (5).

Studied outcomes: The data obtained was studied with the target outcome of age and sex distribution, treatment mode offered (conservative vs. operative), functional outcome and complications.

Data analysis: SPSS version 17.0 (SPSS Inc., Chicago, Illinois) was used to analyze the data. Frequencies and percentages were calculated. Tables, graphs and pie charts were plotted to represent the data.

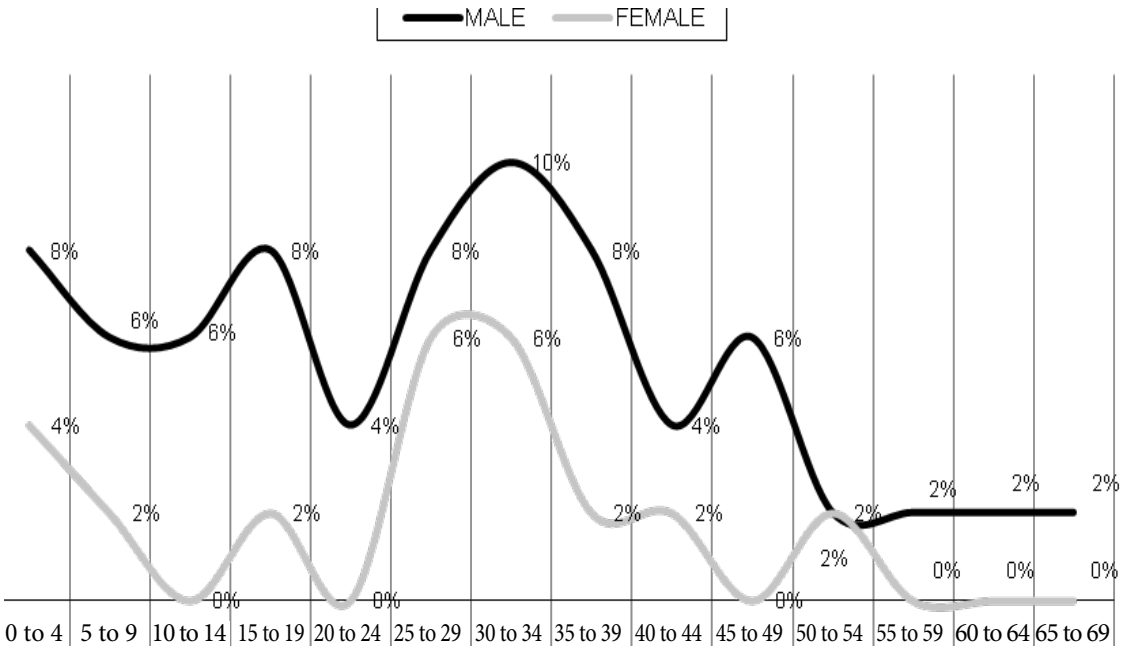
Ethical considerations: Ethical approval was from the local institutional research committee ethics board of AKUH,N. All information was confidential and used for the sole purpose of the study.

Results

Patient demographics: During the study period (2009 - 2011) a total of 51 patients with clavicle fractures were treated at the AKUH, N. The youngest of the patients was 1 month old with the oldest being 77 years old. In total, 13 of the fractures occurred in females and 38 in males, resulting in a male to female ratio 3:1. The distribution in age groups and sex is shown in Figure 1. The modal age group was 30 – 34 years for both males (n=6) and females (n=3).

Figure 1

Clavicle fracture distribution by age and gender



Fracture characteristics and treatment: On the fractures site, 32(63%) occurred in the middle third, with 18(35%) and 1(2%) occurring in the lateral and medial thirds respectively (Figure 2). The sex distribution on basis of site is shown in Figure 3. On the treatment modality, conservative (non-operative with collar and cuff sling) management was offered for the medial third fracture (100%, n=1), for 14 (78%) of the lateral third and 24 (75%) for the middle third fractures (Figure 4). Operatively treatment of lateral third fractures was by K-wiring, while the middle third was by plating.

Figure 2

Fracture site in percentages of clavicle fractures

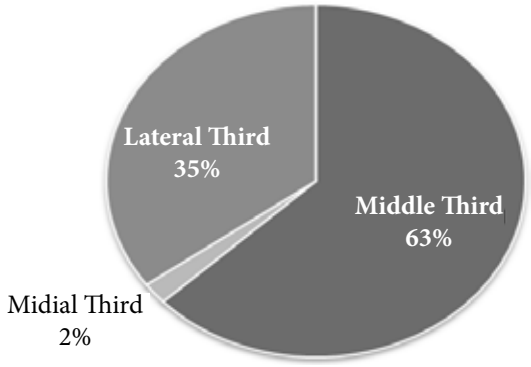


Figure 3

Fracture site distribution by gender

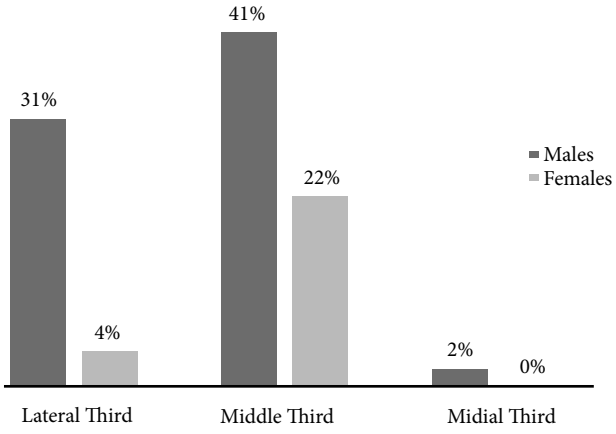
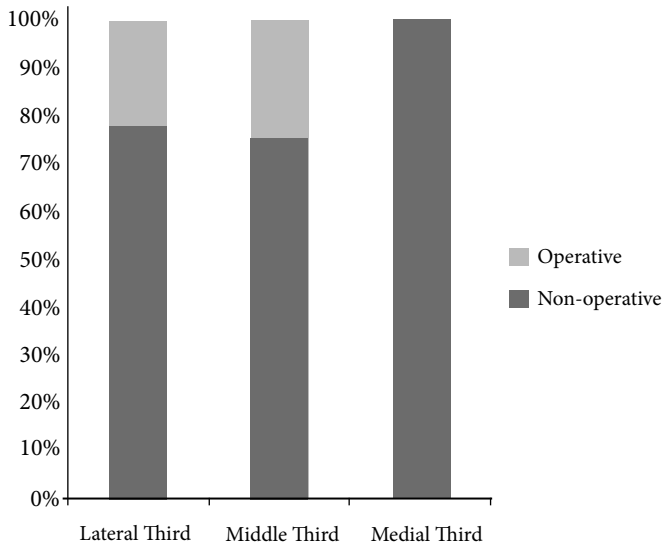


Figure 4

Fracture treatment by site and method



Treatment outcome and complications: Of the 39 patients treated non-operatively, 32 (82%) had a good outcome with no complications, 2 (5%) patients developed non-union requiring operative management and one (2.5%) developed mal-union leading to deformity. Three (8%) complained of pain and one (2.5%) required physiotherapy due to surrounding joint stiffness. Of the 12 patients treated operatively, nine (75%) had a good outcome with no complications, two (17%) patients required a second operation with one developing osteomyelitis and the other had failed fixation of the clavicle, and one (8%) other patient complained of pain. No patient had a recorded mal or non-union (Table 1).

Table 1

Complications developed in operative and non – operative treatment

Complication	Non-operative No. (%)	Operative No. (%)
None	32 (82)	9 (75)
Non – Union	2 (5)	0
Mal – Union	1 (2.5)	0
Pain	3 (8)	1 (8.3)
Stiffness (Physiotherapy)	1 (2.5)	0
Osteomyelitis	0	1 (8.3)
Failed fixation	0	1 (8.3)
Total	39 (100)	12 (100)

Discussion

Clavicle fractures were more common in males in the present study, with males being almost three times the number of women. This is in keeping with previous studies done in the past (1, 2, 6), where the male to female ratio varied from 1.4: 1 to 3.6: 1. This has been attributed to the aetiology or mechanism of injury of the clavicle which has been primarily related to outdoor activity and sports (2, 6). Consequently, because males are more involved in outdoor and sporting activity compared to women it is expected that they would have a higher incidence of clavicle fractures. Although the age of the patients in the present study varied from 1 month to as old as 77 years, the modal age group for both sexes was at 30 – 34 years. However, this was not in keeping with previous studies conducted on the epidemiology of clavicle fractures where the peak incidence is found in the less than 30 years old (2,6).

This was based on the fact that most of the fractures occur in students in tertiary education who undertake a lot of sporting and outdoor activity (2). The findings in the present study may be explained by two factors. One is the increase in the number of adults involved in professional contact sports locally as opposed to it being a leisure activity and hence would explain the older age. Secondly, the study was conducted at a tertiary private hospital where access to the general population is limited by economic factors.

In the present study, most of the fractures occurred in the middle third, with the second highest being in the lateral third and only one occurring in the medial third. This is in keeping with previous studies conducted on the location of clavicle fractures (5, 6, 20, 21). Middle third fractures of the clavicle are the commonest due to a number of reasons. Firstly, embryologic fusion of cortical to cancellous bone occurs at the middle third of the clavicle which has two sites of ossification rendering it a mechanically weak point. Moreover, other anatomical factors that can explain this include the change of bone anatomy from flat to round bone, the presence of the foramen for the nutrient artery on the inferior surface of middle third and the origin of subclavius muscle from the middle third of clavicle. All these factors make the middle third a mechanically weak point therefore predisposing it to fracture occurrence.

The treatment of clavicle fractures was mostly non-operative and this was true of all three groups on the basis of Allman's classification. Operative management was offered for the lateral and middle third with the former being by K-Wiring and the latter plating. Although this is in keeping with an older approach to treatment of clavicle fractures (6,7,12), more recent evidence advocates for primary operative treatment of displaced fractures (4,9,10,23). The preference of non operative management in the present study may be based on the fact that most of the fractures may not have been significantly displaced to advocate for operative management or that the patient preference to avoid surgery may have played a role. The choice of the operative management modality was in keeping with both current and past practice (22,23) where K wiring was advocated for lateral third fractures (24) and plating is advocated for middle third fractures (22). Both methods have been associated with a more rigid stabilization, better pain relief and early mobilization rates (4).

Patients treated non-operatively in the study had reported non-union and mal-union as opposed to none in the operatively treated. However, operatively treated patients had the more severe complications of osteomyelitis and failed fixation of the clavicle. These findings are in keeping with previous studies performed in clavicle fractures where lower non and mal-union rates have been reported in operatively managed fractures (22) with more severe complications observed in operatively treated patients (23,25,26). Some mal-union has been observed in previous studies as a non significant deformity (14) due to its lack of functional restriction. In the present study operative treatment was associated with higher complication rates as opposed to non-operatively treated clavicle fractures. The complication of pain was common in both operative and non-operatively treated fractures. This is in keeping with previous studies (27) although the added advantages of lower cost and lack of post-operative patient morbidity favor non-operative management (4).

The present study had limitations. It being a retrospective study, effective and comprehensive data collection was impaired by relying on file review. The effect of this was however reduced on pertinent issues like complications suffered as patients were contacted for details not present in the files. Secondly, the small number of operated cases may be inadequate to compare with conservative care.

CONCLUSION

Clavicular fractures are observed frequently in the study setting, with males being affected more than women. Most of the fractures were treated non-operatively, and this was associated with lower rates of complications. Fewer fractures were treated operatively with a larger proportion of patients developing serious complications. Consequently, although operative treatment is associated with early mobilization and a more rigid stability it may have higher complication rates and this favors non-operative management of clavicle fractures

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