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CHRONIC OSTEOMYELITIS IN A UGANDAN RURAL SETTING
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ABSTRACT

Objective: **To determine the incidence pattern and outcome of chronic osteomyelitis in a rural setting.**

Design: **A prospective descriptive study where a proforma was drafted to study all consecutive patients with features of chronic osteomyelitis over a period of six years, Clinical findings on presentation, treatment, duration of symptoms, initial treatment sought, operative treatment, post operative outcome and demographic data were all documented.**

Setting: **Mityana hospital, a rural 120 hospital bed, located in Mubende District. It serves Mubende district and the neighbouring districts of Mpigi, Sembabule, Kyenjojo, Kibale and Kiboga. The majority of the population in these districts are mainly peasants involved in cattle keeping and agriculture.**

Patients: **One hundred and twenty patients with chronic osteomyelitis were treated between June 1996 - June 2001.**

***Results*:** **One hundred and twenty patients with chronic osteomyelitis seen in a period of six years, involving various bones of the body. Forty five percent were females, the highest incidence occurred in the age range of 10 - 19 years. The commonest a etiological history was by pricks. The bones most frequently affected were phalanges (43.3%) followed by the tibia (21.6%). Forty four percent of these patients first used local herbs before going to hospital. Fifty five percent of the patients were found to have a big spleen of not less than 12cm below the costal margin and the best treatment option was sequestrectomy and curretage with imperical administration of antibiotics. Complications observed on follow up were: cosmetically bad fingers where curretage and sequestrectomy were done. Distortion of the foot arches where the matarsals were disarticulated and persistent discharging sinuses.**

Conclusion: **Chronic osteomyelitis is a debilitating dirty disease endemic in the peasantry communities. It persists because of delay in seeking medical treatment because the first line of treatment is mainly herbs where the terminal phalanges were involved. Sequestrectomy and curettage were a better option to disarticulation because the function of the finger is not interfered with. The biggest number of cases seen involved the phalanges (45.3%) followed by the tibia 21.6% because of the nature of occupation of the rural communities.**

INTRODUCTION

Osteomyelitis is an inflammation of bone. The history of osteomyelitis dates as far back as 4000 years basing on observation of osteomyelitic lesions in Egyptian mummies. The term osteomyelitis was first coined by Nelatone to describe an old disease which was well pictured in the Corpus Hypocrites.

This disease most frequently affects infants and children. Although it may affect any age, its about three to four times as common in males as in females. The disease presents in stages:

Acute osteomyelitis: When inflammation has occurred not later than three weeks. However it can be sub classified as early if it is not associated with an abscess or late where there is an associated abscess occurring greater than 48 hours to three weeks.

Chronic osteomyelitis: Is considered present when the symptoms and signs have stayed for more than three weeks before initiation of therapy. The subacute form was first described in 1836 by Benjamin Brodie and it may manifest without an acute phase but with an insidious onset, mild pain and little functional impairment.

However acute, subacute and chronic osteomyelitis can be clearly differentiated clinically and radiographically. This inflammatory process is caused by an infection usually by gram positive pyogenic bacteria especially *staphyloccocus aureus* but occasionally it may be caused by *pneumococcus, salmonella* and *mycobacterium.*

It is spread in the following ways: Haematogenously; direct extension of an adjacent infetive process like boils, pyomyoscitis and abscessed teeth and external introduction of the organisms like in pricks, open fractures, bites and cuts (1).

Haematogenous osteomyelitis reaches the metaphysis through a nutrient artery. These pathogens lodge in the metaphyseal sinusoids especially in children where the metaphysis has a different blood supply from that of the epiphysis(2,3). From the various sinusoids infection spreads to cause secondary thrombosis of the nutrient arteries. There is no communication between metaphyseal and epiphyseal arteries in adults. This makes osteomyelitis slightly rare in adults. It is fairly common in the phalanges as an extension from pulp inflammation which causes thrombosis of the digital and nutrient arteries causing infarction of the phalanx and eventual osteomyelitis. Bone inflammation is characterized by the following:

- Vascular engorgement
- Oedema
- Cellular response and abscess formation
- Irregular decalcification of bones
- Pyogenic exudate and necrosis in the metaphysis.

This infection spreads to the subperiosteal space of metaphysis through volkmans canals(2,3) causing elevation of the periosteum and its rapture, making pus to escape into soft tissues, or if the metaphysis is intararticular like in the neck of the femur, the abscess raptures into the joint causing suppurative arthritis. Osteomyelitis commonly involves the metaphysis of the lower end of femur, upper end of tibia and distal metaphysis of radius and humerus. However any bone may be affected.

Some people are more predisposed to infection than others especially the extremes of ages, the immuno suppressed, sicklers especially to salmonella osteomyelitis or those on immunosuppressive treatment.

Diagnosis is based on good history, clinical examination, laboratory investigations, for isolation and sensitivity of organisms and other investigations especially radiographic including X-rays, linear and computed tomography, bone scan and imaging with radionucleid.

MATERIALS AND METHODS

A six year prospective study was carried out on patients presenting with features of chronic osteomyelitis between June 1996 to June 2001 at Mityana Hospital, a rural 120 bed hospital, located in Mubende district but serving the neighbouring districts of Kiboga, Kyenjojo, Sembabule, Kibale and Mpigi. The main economic activities in these districts are pastoralism and agriculture. All patients gave their informed consent, a standard questionnaire was filled, and demographic data was taken for each. Chronic osteomyelitis was diagnosed after taking history and revealing any of the following signs: swelling, discharging sinuses, extruded sequestrum; peculiarly healed scars with areas of pus formation and adherent scars X-ray findings of sequestrum, a periosteal reaction, involucrum, irregular sclerosis, osteolytic bone changes. Abscess cavities and soft tissue swellings. They were started on antibiotics empirically because of lack of facilities for culture and sensitivity.

The following methods of treatment were offered basing on presence of mature sequestrum, abscess cavities, soft tissue abscess.

- Sequstrectomy, curettage and debridement(4)
- Incision and drainage, curettage and sequestrectomy
- Disarticulation, debridement
- Antibiotic coverage in all instances(2)

These patients were followed for three months to establish the outcome by physical examination and X-rays.

RESULTS

A total of 120 patients were seen over a period of six years, on an average of 20 patients per year. Out of these, 57 were females and 63 were males.

Table 1

Aetiological Association

Aetiological factors	No. of patients	%
Pricks (thorns, nails, sticks)	56	46.6
Following abscess/pyomyoscitis	40	33.3
Human bites	12	10
Immunization	2	1.6
Burns	1	0.8
Open fractures following accidents	7	5.8
Gun shots	2	1.6
Total	120	100

Most of the osteomyelitis followed pricks and pyomyoscitis/abscesses because of the traditional beliefs of having been bewitched (Etalo) and use of traditional herbs in an acute stage such that by the time appropriate medical treatment is sought its already in a chronic stage.

Table 2

Age distribution of patients with chronic osteomyelitis

Age Range	No. of Patients	%
0-9	18	15
10-19	45	37.5
20-29	15	12.5
30-39	9	7.5
40-49	3	2.5
50-59	9	7.5
60-69	12	10
70+	9	7.5
Total	120	100

Highest incidence was in the age range of 10-19 years; (37.5%) and majority of patients lie between 0-39 years. These are some of the most active years.

Table 3

Duration of symptoms before presentation

Duration (Months)	No. of patients	%
0-6	75	62.4
7-12	15	12.5
13-18	9	7.5
19-24	4	3.2
25-30	2	1.6
31-36	2	1.6
37-42	2	1.6
43-48	2	1.6
49-54	-	-
55-60	1	1
61+	1	0.8
Total	120	100

Sixty two percent of the patients presented within a period of 0 - 6 months of disease. The delay is caused by the poor treatment. It is interesting to note that one can stay with this disease for over five years, while visiting all sorts of doctors before he can eventually get cured if lucky or develops serious complications like stiffness, malignancy, joint infection and pathological fractures.

Table 4

Initial treatment used

Initial treatment option sought	Numbers	%
Local herbs	42	34.9
Self medication with antibiotics	9	7.5
Traditional bone setters	21	17.4
Neighbouring clinics	18	15
Hospitals	18	15
Local herbs and self medication	12	10
Total	120	100

Generally, the first line of treatment in the rural communities is use of herbs, but failure to visit hospitals may be attributed to many factors like ignorance, poverty, long distance from hospitals to mention a few.

Table 5

Incidental associated pathological condition

Pathological Condition	Number of patients	%
Big Spleen> 12 cm below LCM	66	55
Extremes of ages i.e < 1yr > 70 years	20	16.6
Sickle cell anaemia	6	5
Diabetes mellitus	2	1.6
H IV	2	5
Tuberculosis	6	1.6
No identifiable pathology	18	15
Total	120	100

Fifty five percent of patients were found to have big spleen. Malaria is endemic in this region and it commonly causes a big spleen in people of western Ugandan origin. Sixteen percent belonged to extremes of ages where immunity against most infective organisms is very low; as indicated that osteomyelitis is a disease of children(2,5).

Table 6

Anatomical sites of the lesions

Bones Affected	Number of bones	%
Occipital	1	0.8
Humerus	9	7.5
Radius	5	4.1
Ulnar	3	2.5
Phalanges of: Thumb	18	15.0
Index	9	7.5
Middle	12	10
Ring	nil	nil
Little finger	9	7.5
Ribs	1	0.8
Ilieum	1	0.8
Femur	12	10
Tibia	26	21.6
Fibular	2	1.6
Calcaneous	2	1.6
Metatarsals 1st	-3	2.5
5th	-1	0.8
Pedal phalanges	6	5
	120	100

The bones most frequently affected in this environment are phalanges 45%, followed by the tibia 21.6%. There is involvement of unusual sites like the occuput, calcaneous, metatarsals and ilieum.

Table 7

Surgical management of affected bones

Sequestrectomy, Currettage, Debridement and Antibiotics		Incision, Drainage Curretage, Antibiotics		Dusartialation Debridement Antibiotics		Excision Antibiotics	
Bone	No. of patients	Bone	No. of patients	Bone	No. of patients	Bone	No. of patients
		Phalanges					
Humerus	9	Thumb	18	Little Finger	6	Ilieum	1
Radius	5	Index	9			Rib	1
Ulnar	3	Middle	12				
Femur	12	Little Finger	3				
Tibia	20	Tibia	6				
Fibular	2	Occiput	1				
		Calcaneous	2				
		Pedal phalanges	6				
		Metatarsals	4				

DISCUSSION

The male to female ratio in this study was nearly 1:1(63:57). This is in agreement with most other studies elsewhere(5). The ages ranged from birth to seventy and above but the peak age incidence lied between 10 - 19 years followed by 0 - 9 years. Osteomyelitis is regarded as a disease of children (1,4) . These findings don't vary much from that in a rural settings where the years of high activity are 5 to 45 years. Although children have low immunity, they are not highly exposed to risky tasks that may lead to osteomyelitis.

Forty six point six percent of all the patients seen attributed the disease to having had some kind of a prick because of the nature of their activities of agriculture and pastoralism. These were closely followed by abscesses (5-7) in other cases there is usually but not always a history of infection, and there may be an adjoining source of infection like chronic ulcer(7). Usually in rural communities, pricks are never taken seriously. One continues with routine activities not even bothering to do some surgical toilet, which is done at the end of the day; as if that is not enough, if one is to consider treatment, the first line is use of herbs: (Table 4) where 34% of patients on getting the first symptoms resorted to local herbs. It is only after worsening of the symptoms that one decides to seek other treatment.

Thirty three percent attributed their osteomyelitis to abscesses. Traditionally in this region, abscesses are believed to follow some bewitching (Etalo) and no medical treatment should be given unless it is "ripe" apart from traditional herbs. Phalanges were involved most especially the distal ones. This follows infection in the pulp space (5-8) where the deep fascia fuses with the periosteum of the terminal phalanx, making it a closed fascial space which is fully packed with fat and feebly partitioned by fibrous septa. Among these septa runs the terminal branches of the digital arteries (5,6) and these are easily cut off by pressure in the compartments, leading to thrombo arteritis and subsequent distal bone infarction. Complicated by osteomyelitis, the epiphysis and base are not affected because their vessels are given off before the arteries enter the pulp space(6).

So a delay in getting the abscess incised enhances thrombosis of the vessels and eventual osteomyelitis. Also a delay in incising abscesses or and pyomyoscitis in other areas causes infection and pus to gravitate around fascial spaces and eventual involvement of bone(9). But the reverse is true that if the infection is uncontrolled the periosteum ruptures allowing pus to escape into soft tissues(1) leading to abscesses. Ten percent of the patients had human bites. These are potentially infected and when poorly managed they end up with a complication of osteomyelitis and or gangrene(10). Two patients attributed the osteomyelitis to immunization on the thigh due to use of non sterile needles.

Forty five percent of the bones affected were the phalanges. This is in contrast with other studies where the tibia, femur, radius and humerus have been leading(5) with no mention of phalanges, followed by the tibia and the femur as found elsewhere (4).

Occipital involvement followed a retained foreign body after a road traffic accident, but infection was limited to the outer (Table 4). Infection of phalanges mainly followed pricks. Also tarsals and metatarsals were involved (1) in the same way.

Fifty five percent of the patients on examination were found to have a big spleen not less than 12cm below the left costal margin (LCM); this was an incidental finding and can be explained by the fact that these patients live in an area of high malaria endemicity. However, possession of a big spleen is known to cause a leucopenia which results from sequestration of granulocytes in the enlarged spleen and has been associated with ulceration of legs(11). But since the majority of these patients with osteomyelitis had a big spleen, the predisposition could be through the leucopenia and anaemia due and hyperspersplenism.

Sicklers are known to be prone to salmonella chronic osteomyelitis through the vaso occlusive crisis that result into frequent bone infarctions. Sicklers have reduced immunity(5) in addition. A small percentage of patients with osteomyelitis had associated diabetis mellitus, HIV and tuberculosis 1.6%; 5% and 1.6% respectively. These diseases lower the immunity of the body making even less virulent organisms to cause the disease. However these patients were not subjected to HIV testing. Its only 5% that came with HIV results. Probably if all these patients had been subjected to test the numbers with HIV would have been higher. All diabetics had osteomyelitis of the phalanges of the feet and HIV cases had the hand phalanges involved.

The remaining 15% of the patients had no obvious incidental pathological findings. Treatment is primarily surgical and the quality of surgical debridement remains the most critical factor in the successful treatment of chronic osteomyelitis(2,3,5,6,9,11-15) mainly to remove dead or diseased bone (which is the deport of infection) necrotic, devitalized fibrous tissue. All these diseased necrotic tissues and bone are associated with reduced blood supply and consequent compromised antibiotic delivery(1) to the infection site.

To excise the sequestrum, one had to ensure that there is an adequate mature involucrum(2,3,6,8,15) so as not to create a big defect of the diaphysis in the long bones. In addition, aggressive surgical debridement and appropriate soft tissue coverage(2) was done.

Sequestrectomy is complimented by adequate curettage till all dead and infectious bone is completely swept as indicated by uniformity of bleeding from curetted surface and uniform hardness of remaining involucrum(1,5), the curreted site is irrigated and rinsed with 0.9% normal saline; if the defect created by sequestrectomy and curettage is not big and adequate debridement of surrounding soft tissue has been satisfactory, the wound may be closed primarily or skin grafted to cover the affected bone but if the surrounding soft tissue debridement is not satisfactory because of the

amount of inflammation, then the wound is packed and left open for a delayed primary closure(1,3,4,6).

Once the defect left by sequestrectomy is big, the site is properly covered with soft tissues and then the bone is supported by a POP cast for six weeks to avoid pathological fracture. In this study, no bone grafting was used since all the defects were small(1,3,5,7). Plaster of Paris was applied on(6) tibia for support for six weeks, the rest of the bones did not require support. No external fixators were used for stabilization(7).

Management of the phalanges was however different four finger amputations were done by disarticulation at the metacarpal phalangeal joints, where the fingers involved had all phalanges eaten up with a lot of soft tissue inflammatory debris. However where the thumb and index fingers were involved, maximum preservation was aimed at by being as conservative as possible, this effort was augmented by the fact that these two fingers being principle in the hand, once they get affected one is forced to present earlier than when other fingers are affected, actually most of these patients presented within the first six months.

Where the terminal phalanges were involved, all was done to save the base of the terminal phalanx where the flexor/estensor tendons are inserted as well as the nail bed so as to preserve function of the finger and cosmesis(7), this was achieved by use of curettage of all necrotic bone and tissues and normal saline irrigation followed by delayed primary closure. The results were good but the fingers healed with ugly heads but function well preserved. Bone excision was used on the ilieum and the rib, healing was achieved but where the metatarsals were disarticulated there was disruption of the foot arches to some extent, but as the involucrum hardens and grows, the distortion reduces but follow up was still in progress.

For the calcaneous, debridement and curettage through the medial and lateral, incision was done combined with antibiotics and flagyl. No excision was done as advocated for by Gaenslen because these two patients were children where the growth of the apophysis had to be preserved(2-4,12,14,15) for the ilieum, chronic osteomyelitis had affected the region close to iliac crest, excision of the affected bone was done within the normal tissue limits. Haemostasis was achieved and blood loss was minimal(9). No auto transfusion was done as advocated(6,8).

Appropriate antibiotic therapy is necessary to arrest osteomyelitis along with adequate surgical therapy(7). Several factors are considered in choosing the appropriate antibiotics. These are; infection type, infecting organism, sensitivity results, host factors and antibiotic characteristics. But in this study, antibiotics were given empirically basing on the sensitivity of the organisms that are mostly suspected to be causing infection(3-5). Since there were no facilities for isolation of the organisms in all these surgical cases patients were started empirically on 3rd generation cephalosporins and metronidazole systematically for three days followed by oral administration for six weeks (3,4,7,9).

Since the management of this debilitating disease requires delivery of the appropriate chemotherapeutic agent at the site of infection.

All these patients were followed up for three months, there were a few complications observed. These were cosmetically, urgly terminal phalanges, especially where curettage and debridement was done(1,6) minor distortion of the foot arches where the metatarsals were disarticulated and persistent discharging, sinuses in eight cases which could be attributed to inability to do sensitivity. No death was recorded.

In conclusion, chronic osteomyelitis is still endemic in the peasantry communities of this region. It persists because of many reasons related to their way of life but in addition because of the long delay in seeking medical treatment since the first line of treatment is herbs. 3rd generation cephalosporins were able to wipe out these organisms because these drugs are not abused, reason being that they are expensive and not easily accessible to the rural communities.

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