

Bilateral Femoral Osteomyelitis Following Venous Cutdown

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Received September 10th, 2013; revised October 15th, 2013; accepted October 28th, 2013

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ABSTRACT

Obtaining rapid access in emergency situations for infusion of IV fluids, blood and blood products or medications is vital in using various methods. These include venopuncture, intraosseous infusion, percutaneous central venous access and peripheral venous cut-down. We report a case of a 30-year-old woman who developed severe obstetric hemorrhage and had peripheral venous cut-down that was complicated by bilateral femoral osteomyelitis. This is a rare occurrence and this case report shows the need for strict adherence to safety precautions to prevent complications such as that from the procedure.

Keywords: Bilateral; Femoral; Osteomyelitis; Venous Cut-Down

1. Introduction

A venous cut-down is one of the methods of gaining access to the circulation in a patient in whom direct venepuncture is difficult. Thus alternative routes must be sought to obtain rapid access in emergency situations for the purpose of infusing fluids, blood and blood products, or medications [1]. These include intraosseous infusion, percutaneous central venous access, and peripheral venous cut-down. Although the venous cut-down has largely been replaced by over-the-wire percutaneous catheters (Seldinger's technique) [2], it remains an excellent alternative when other approaches have failed [1]. This invasive procedure has its attendant risks which include inadvertent injury to blood vessel and associated structures, cellulitis, haematoma, thrombophlebitis, venous thrombosis [3]. Though osteomyelitis rarely complicates venous cut-down, this case report illustrates that it can occur. Bilateral femoral osteomyelitis from a venous cut-down is rarer still.

2. Case Report

At a government hospital, a 30 year old woman had pre-

sented with severe episode of bleeding per vagina following delivery and subsequent loss of consciousness. Efforts at securing intravenous access for resuscitation using percutaneous venepuncture were difficult hence a saphenous vein cut-down was done on her left leg. She was resuscitated with intravenous fluids and blood products. Curettage was done to remove retained products. Haemostasis was achieved; however, the cut-down site became swollen and extremely painful by the second day of its insertion. The catheter was only removed on the fourth day. The patient subsequently developed pain in the left thigh a week later. The cut-down site wound also broke down to leave an ulcer on the leg. She was given various oral and parenteral analgesics for the pain until she was discharged home.

Her pre-morbid state was not remarkable. There was no prior history of blood transfusion. She is not a known hypertensive, diabetes or sickle cell disease patient. Pregnancy lasted for 38 weeks and was uneventful. She was only on haematinics during pregnancy.

The patient persistently complained of severe throbbing pain in the left lower limb with associated difficulty in walking which lasted for about 4 weeks before presenting at our orthopaedic clinic. She was neither febrile,

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nor icteric on examination. There was an ulcer in the antero-medial aspect of the left leg just above the left ankle (previous cut-down site) measuring 4 cm × 5 cm (**Figure 1**). The neurovascular status of both legs was normal. There was also a markedly tender swelling in the distal third of the left thigh, with differential warmth. A presumptive diagnosis of osteomyelitis was made. Plain X-ray of the left thigh showed a definite sequestrum with bone in 'bone appearance' (involucrum) in the middle and lower third of the left femur (**Figures 2(a), (b)**). Other laboratory investigation results include haematocrit which was 35%; total WBC 7500/mm³ (Neut: 38%, Lymph: 68%). HIV screening was negative. Blood group was B Rh positive. Haemoglobin genotype was AA.

Test aspiration of the left thigh swelling yielded pus, and she went on to have trephination of the left femur. About 200 mls of pus was evacuated from the marrow and a sample sent for microscopy, culture and sensitivity. She was placed empirically on intravenous Ciprofloxacin (200 mg) every 12 h and intravenous Ampiclox (1 g) every 6 h. The wound was then dressed daily with normal saline. Patient became pain-free following the procedure.

Result of culture yielded heavy growth of *Escherichia coli* sensitive to Gentamycin and Chloramphenicol; resistant to Augmentin, Ampicillin, Ciprofloxacin, Perfluoracin, Ofloxacin, Cefuroxime and Ceftriaxone.

The drugs were changed according to the culture result. She received intravenous chloramphenicol and gentamycin which she had for two weeks. It was then continued as oral medications for the next four weeks.

While on admission, she developed throbbing pain in the right thigh with tenderness on palpation of the distal aspect of the right femur. There was associated fever. Test aspiration done at the point of maximum tenderness was negative. The following investigations were done: haematocrit 38%, WBC 9700 cells/mm³ (Neut: 59%, Lymph: 38%, Eos: 03%), ESR: 122 mm/hr. Plain X-ray



Figure 1. The venous cut-down site on the left leg.



(a)



(b)

Figure 2. a: Plane X Ray of the Left Thigh: Lateral view showing 'bone in bone appearance' (sequestrum). b: Plane X Ray of the Left Thigh: AP view.

of the right thigh was done which showed early sequestrum formation (**Figures 3(a), (b)**). Trephination was again done on the right femur with drainage of 100 ml of pus from the marrow with subsequent relieve of the pain. Culture yielded *Escherichia coli* with the same pattern of sensitivity and resistance. Blood culture however was negative. The patient was discharged to follow-up clinic after four weeks on admission.

During this period the left thigh incision wound still discharged purulent fluid while that of the right thigh had healed. The venous cut-down site on the left leg had healed completely. The patient also had acute episodes of fever and pain whenever the chronic discharging sinus on the left thigh was quiescent. She began ambulation using bilateral axillary crutches for a period of eight (8) weeks and then went on to partial weight bearing with a left arm crutch. The range of motion (ROM) for the right knee was 0° - 120° and the left knee; 0° - 110° . She is still on follow-up visits.



(a)



(b)

Figure 3. a: Plane X Ray of the Right Thigh: lateral View showing early sequestrum formation. b: Plane X Ray of the Right Thigh: AP view.

3. Discussion

The use of venous cut-down to obtain access to the circulation could be the last resort in patients who are critically ill and in whom percutaneous venepuncture may be difficult [4]. Examples include patients in shock, paediatric age group, sclerosed veins of intravenous drug abusers.

The most preferred cut-down access site is the saphenous vein above the medial malleolus of the tibia, but antecubital, axillary, cephalic and femoral veins are also suitable [5]. The skin over it is prepared with antiseptic solution and draped. Local anaesthesia using 1% lidocaine with or without epinephrine is applied. Via a 2.5 cm transverse incision on the skin, the vein is dissected bluntly from its bed using a curved haemostat to a length of 2 cm. Sutures are passed inferiorly and the exposed vein is ligated distally, with the free end used for traction. A careful transverse venotomy is then done using a scalpel no more than half the diameter of the vein. A plastic catheter (usually > 14 ga) is introduced into the vein and it is secured with a proximal suture. The skin incision is closed with interrupted sutures. Intravenous tubing is attached to the catheter and a sterile dressing is applied.

Careful attention to the cut down site, by daily sterile dressing is mandatory, particularly in the lower extremities, in view of the increased susceptibility to infections. If any sign of infection at the site is identified the catheter has to be promptly withdrawn. Strict asepsis is important as well as avoiding long duration of procedure.

The usual time to achieve venous cut-down by paediatric surgeons was reported as 6 minutes in children aged 6 - 16 years, 8 minutes in those aged 1 month to 5 years, and 11 minutes in neonates [6]. This time delay makes its use unrealistic for most clinicians, and intraosseous or percutaneous femoral access can be achieved more rapidly [7,8].

This invasive procedure can be complicated by cellulitis, haematoma formation, thrombophlebitis, venous thrombosis, injury to vessel and other associated structures. These complications can be minimized by meticulous technique, with attention to proper site selection and catheter care.

The incidence of osteomyelitis from venous cut-down is not stated in the literature; however the incidence of osteomyelitis occurring from intraosseous infusion is 0.6%. The incidence in children with osteomyelitis that presented to a teaching hospital over a four year period was 24 cases/year [9], while in another retrospective study an average of 19 cases of chronic osteomyelitis presented yearly [10]. Often times the presentation is late making the infection deeply seated within the affected bone [11].

The commonest sites of chronic osteomyelitis have been noted in the femur and tibia in various studies

[10,12,13]. The occurrence of multiple bone involvement is noted to be common especially in patients with sickle cell anaemia [10,14,15,17,18], although a review of chronic osteomyelitis by Nwadiaro *et al.* observed the converse to be true in Jos, Nigeria [16]. Other researchers have also noted osteomyelitis involving multiple sites. A case of multiple bone and joint diseases in a 20 year old male, Nigerian with sickle cell disease was reported by Olaniyi *et al.* He developed avascular necrosis (AVN) of the bilateral femoral and right humeral heads, bilateral femoral and left humeral chronic osteomyelitis and fixed flexion deformities of both hips and left shoulder joints, following a painful vaso-occlusive crisis [14].

Ransool reviewed a series of eight children with bilateral pyogenic osteomyelitis and observed four cases involved the femurs, two cases involved the tibia and one case each involving the calcaneum and the clavicle [22]. Picillio *et al.* also reported a case of femoral osteomyelitis with knee osteoarthritis due to *Salmonella enteritidis* in a female patient being managed for long standing systemic lupus erythematosus (SLE) with cytotoxics and corticosteroids [22]. The aetiological agent found in our case was *E. coli*, although the common aetiological agent has been noted to be *Staphylococcus aureus* [9,10,13,19,20]. Infection from gram negative organisms is also common [9,10,15,19,20].

Treatment modality employed for this patient was trephination of the affected bones. Other adjunctive modalities that have been added to this include the use of hyperbaric oxygen, antibiotic beads, pulsed electromagnetic fields/ultrasound, biofilm microbiology and platelet rich plasma [21]. Information on the efficacy of these methods is limited. However they have been found to enhance bone healing and control infection by promoting the bactericidal activity of neutrophils, suppressing anaerobic organisms, promoting angiogenesis, collagen synthesis, osteogenesis and increasing vascularity [21].

Major complications that may arise from chronic osteomyelitis observed in the case series by Nwadiaro *et al.* are persistent drainage, recurrence, limb length discrepancy, severe osteoarthritis and pathological fracture [10]. In our case, there was only persistent drainage of the left thigh sinus associated with relapse of pain in the left femur and fever which then resolves as the sinus becomes active. The reduction in the ROM is not severe as to affect her gait.

4. Conclusion

We have presented this case to show that osteomyelitis can complicate a venous cut-down and the bilateral osteomyelitis of the femur which is a rare occurrence that can result from the procedure. It is also advisable to take the necessary precautions that would prevent this complication. Early detection and prompt commencement of

treatment of acute osteomyelitis would also prevent it from progressing to chronic infection.

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