

# A misplaced intramuscular injection and limb-threatening ischemia

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## ABSTRACT

Femoral artery thrombosis is a rare complication of intramuscular (IM) injection in children. A 12-month-old boy presented with right lower limb ischemia and digital gangrene 3 days after an injection of ceftriaxone administered to his medial aspect of the right thigh. Successful thrombolysis and partial limb salvage was possible with enoxaparin despite a late presentation. Unnecessary and unsafe IM injection in community practice might lead to such devastating outcome which should be avoided.

**Keywords:** Gangrene, injection, intramuscular, thrombolysis

## Introduction

Intramuscular (IM) injection is a common practice among the rural practitioners and in primary health-care settings. Femoral artery thrombosis is an unusual complication after IM injection which might lead to a serious complication like limb gangrene.<sup>[1-4]</sup> Here, we report a case of a 12-month-old boy, presented with ischemic limb and digital gangrene 3 days after a misplaced IM injection of ceftriaxone by a local practitioner.

## Case Report

A 12-month-old, previously well infant presented with blackish discoloration of toes and part of the right foot for last 3 days. It had developed 12 h after an IM ceftriaxone injection given for fever and respiratory infection by a local practitioner. Parents confirmed that the injection was administered over the medial aspect of right mid-thigh. Few hours after the injection, the right lower limb of the baby became cold along with progressive

discoloration of the foot starting from the right second toe. Consequently, the whole of the right leg became tender and limp.

His history was insignificant. His birth, developmental, immunization, and family histories were noncontributory.

On examination, baby was irritable and apprehensive. His right lower limb was motionless like a log of wood [Figure 1]. It was cold, and tender to touch. Pulsations were absent in femoral, popliteal and arteria dorsalis pedis. The part of the foot distal to the base of the metatarsals was blackish indicative of gangrenous change with indistinct line of demarcation. No local skin change was noted at the injection site. Color Doppler of arterial system of right lower limb revealed a large thrombus obstructing the femoral artery lumen. Subcutaneous enoxaparin was started immediately at a dose of 1 mg/kg. An opinion from vascular surgeon was sought for thrombectomy. However, the child improved considerably in next 24 h requiring no surgical intervention. The limb became warm and nontender concurrent with return of all pulses. Doppler revealed a patchy and partial thrombosis.

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Meanwhile, the investigations revealed no abnormality in the hemogram. Liver function test, electrolytes, urea, creatinine, and lipid profile were within normal limits. Studies on venous system of the right leg, renal vasculature, and echocardiography were normal.

Enoxaparin was continued for next 2 weeks and switched to oral acenocoumarol for another 1 week. Initial prothrombin time (PT) was 12.0 (control 11.6), INR was 1.03 and activated PT (APTT) was 27.0 s (control 28.0). PT and APTT were repeated several times to titrate the dose of acenocoumarol. Anti-factor Xa assay for monitoring enoxaparin therapy was not possible due to lack of facility. Repeat Doppler after 2 weeks revealed no thrombus. The gangrenous area gradually receded distally and area of superficial healing was evident [Figure 2]. Ultimately, the limb could be salvaged at the expense of the digits only which required a surgical amputation later [Figure 3].

Antithrombotic workup for detecting underlying primary disease was carried out later revealed lupus anticoagulant (LA) was normal with LA ratio was 1.15 (reference range: 0.8–1.2), Protein C was 86.3% (reference range: 70–140%), Protein S was 89% (reference range: 60–150%), antithrombin C was 113% (reference range: 75–125), activated Protein C resistance (Factor V Leiden) normalized ratio was within normal limit. Homocysteine level in the blood and urine was normal.

## Discussion

Femoral artery thrombosis in children following IM injection is extremely rare. Although drugs such as penicillin, promethazine, Vitamin B complexes, diclofenac had been implicated in a few instances, extensive search of literature could not reveal ceftriaxone as an offender.<sup>[1-4]</sup> Authors presume that it was an inadvertent intra-arterial or periarterial injection which could be possible in case of administration to the medial aspect of the thigh. Postinjection ischemic gangrene may result from direct vascular injury, perivascular inflammation or vasoconstriction from the unintentional intra-arterial injection.<sup>[4,5]</sup> Arterial embolization phenomenon along with intense vasospasm could be other hypothesis.<sup>[6]</sup>

Thrombolytic agents are increasingly being used in last decades, but there is no consensus in indications, dose, mode of delivery, or duration of therapy.<sup>[7]</sup> In children tissue plasminogen activator (tPA) is the agent of choice. Experience with other thrombolytics like streptokinase or urokinase are minimal due to lack of controlled, prospective studies.<sup>[8]</sup> The cost and a late presentation preclude the use of tPA in our case. Enoxaparin, as an antithrombotic agent, is recommended treatment option by American College of Chest Physicians and successful thrombolysis with this drug has been demonstrated in a few cases.<sup>[9,10]</sup> The drug exerts its fibrinolytic activity through stimulation of endothelial release of tPA and increases tissue factor pathway inhibitor release, which inhibits coagulation activity.<sup>[10]</sup> In our patient, we found rapid return of pulse in the



**Figure 1:** Ischemic and motionless right limb with gangrenous changes



**Figure 2:** Gangrenous digits and healing areas after 2 weeks



**Figure 3:** Salvaged right lower limb with amputated digits

affected limb just 24 h after starting of enoxaparin along with improvement of Doppler findings. The distal part of the limb including the digits could not be salvaged probably because there could be underlying necrotic changes already and more tissue damage well before the treatment began.

The idea of presenting the case is to make aware regarding the devastating complication of unsafe injection practice.

Unnecessary IM administration of antibiotics without proper technique is quite common in rural and suburban community practice which must be avoided. Second, in a resource-poor infrastructure, enoxaparin could be a useful option for thrombolysis even when there is a late presentation with a limb-threatening ischemia.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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