Management of traumatic incarceration of metal needle in the knee of children: A case series

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ABSTRACT

Introduction: Foreign bodies constitute a frequent and alarming problem in pediatrics emergencies. The nature, presentation and localization of the foreign bodies are variable. Their management depends on the available technical platform.

Presentation of cases: We report three retrospective cases of traumatic embedded pieces of metal needles in the knee in a 6-year-old male, an 8-year-old female and a 5-year-old male. All the cases were successfully managed in our unit. The left side was involved in one case. X-ray and brilliance amplifier were used to diagnosing and removing the foreign bodies from the knee. The postoperative course was uneventful except in the case of the 8-year-old female who had osteoarthritis.

Discussion: In low-income countries, simple extraction from the soft tissue or arthrotomy could be used to removing foreign bodies in the knee as arthroscopy is often unavailable.

Conclusion: The traumatic impalement of pieces of metal needle in the child’s knee is a rare event. The circumstances of these accidents are very difficult to reconstitute. The arthroscopy has an advantage in their extraction. However, the arthrotomy guided by brilliance amplifier remains the only alternative in low-income countries.

1. Introduction

Accidents involving foreign bodies are frequent and alarming problem in pediatric emergencies. The nature, presentation and localization of the foreign bodies are variable. Their management depends on the technical platform. Some authors have reported traumatic cases of embedded foreign bodies, including the spines of palm tree, broken metal needles and a portion of a sharp metal key ring [1–3]. Arthroscopy procedure has revolutionized its management. We report three cases of traumatic embedded pieces of metal needles in the knee of children successfully managed in our unit and do a literature review. This case series has been reported in line with the updated PROCESS 2020 guidelines [4].

2. Presentation of cases

This study is a retrospective case series of traumatic incarceration of metal needles in the knee of three children successfully managed in our center. These consecutives cases were managed by a junior pediatric surgeon of our unit. Informed consent was always obtained prior to surgery.

2.1. Case 1

A 6-year-old male presented a right painful knee following a traumatic injury. His parents reported a gambling accident in which a metal needle was driven into his right knee.

His past medical history had no particularities.

The physical examination noticed lameness when walking, swelling of the right knee and painful limitation. No patellar shock. No fever was detected.

Both face and profile X-rays showed an opaque thread-like foreign body behind the external femoral condyle in the soft tissue (Fig. 1).

The patient received a serotherapy with tetanus vaccine, analgesics.
The extraction of the metal needle was carried out from the soft tissues, using a brilliance amplifier (Fig. 2). The child was discharged from the hospital on the third post-operative day.

The postoperative course revealed a stiffness of the right knee which has been spontaneously resolved within six months.

2.2. Case 2

An 8-year-old female was referred by a general practitioner to our emergency department. She complained a right knee pain following a crash of the right knee against a wooden chair in which was encrusted a metal needle. Her medical history was normal.

The patient’s history revealed that the accident occurred five days prior. On the clinical examination, we observed a painful walk, a fever (38.6°C), a hot and painful swelling of the right knee with patellar shock and painful limitation of some right knee movements.

The face and profile X-rays of the right knee revealed three thread-like foreign opaque bodies (Fig. 3). Blood count results showed a neutrophil count of 13,200/mm$^3$ and a CRP (C reactive protein) of 163.5 mg/l.

We proceeded to extraction of the piece of needle enmeshed to the face of the patella, an arthrotomy followed by aspiration of a purulent liquid after the opening of the articular capsule. The pieces of metal needles were removed assisted by the brilliance amplifier (Fig. 4). We also completed an articular washing with the physiological solution. She was given intravenous antibiotics (Ceftriaxone and Metronidazole) for five days with a relay per os for a total duration of three weeks.

The child was discharged from the hospital on the tenth post-operative day with an immobilization of the knee for 30 days.

The postoperative follow-up was simple.

2.3. Case 3

A 5-year-old male initially presented to a physiotherapist for pain in the left knee. He prescribed functional rehabilitation sessions on day 1. On day 15, the patient had a pain in the left knee that had progressed to immobility. Any trauma of the knee was reported.

The clinical examination was poor except a moderate pain in the left knee and irritability. The hips and other joints were clinically normal. No infection detected.

Blood tests had no particularities. The C reactive protein was slightly elevated.

Radiographs of the left knee showed an opaque thread-like foreign body near to the internal femoral condyle in the soft tissue (Fig. 5).

The patient received a serotherapy and analgesics. Arthrotomy of the knee is performed with removal of a piece of metal needle, assisted by brilliance amplifier.

The child was discharged from the hospital on the third post-operative day.

Table I summarizes the clinical observations in the three patients.

3. Discussion

Impalement of foreign bodies in the knee of a child is a rare event which often follows a trauma [1,5]. The localization in the knee occurs less frequently than the one in the foot [6]. The circumstances surrounding the injuries in our series are variable and difficult to be specified. The foreign body became embedded following a game accident or a domestic accident. Both boys and girls are involved [1,2,7]. In our case series, two boys and one girl were presented. At the diagnostic level, a standard radiograph is the imaging indicated for the confirmation of the metal foreign bodies in the knee [6].

One of the common complications of the articular foreign bodies is the osteoarticular infection [6,8]. We recorded this complication in one of the children in our series. Osteoarticular infection required the addition of antibiotic therapy. This complication is due to the delay of seeking medical attention and the infectious risk related to the foreign bodies.

On the therapeutic level, the serotherapy and antitetanus vaccine must be systematically managed in order to avoid the tetanus risk of infection [5]. All the children of our series systematically received it.
Removal of foreign bodies is a challenging management in the children. It could be made by arthrotomy or surgical access of the soft tissue of the knee [5,7,9,10]. Arthroscopy is a surgical method in full rise in children. It is important to know the indications for the use of arthroscopy and to respect its precautions with the existence of the growth plate in particular and residual growth of the operated member. The arthroscopy constitutes the therapeutic means more indicated in the extraction of the foreign bodies positioned in the knee [7,9,11]. In low-income countries, the arthroscopic's practice becomes impossible in the extraction of foreign bodies of the knee since this equipment is often unavailable. Removal of foreign bodies requires arthrotomy or access of the soft tissue according to their localization. This extraction process is sometimes assisted by the brilliance amplifier. The arthroscopy has some advantages compared to the conventional surgery. Indeed with arthroscopy, the operational continuations are simple and functional recovery is fast with better esthetic results [11]. In our series where the arthrotomy was used assisted by the brilliance amplifier, the post-operative follow-up was uneventful. One child presented in the post-operative courses, a moderate stiffness of the knee which had a favorable evolution with self-rehabilitation.

Fig. 3. The face (a) and profile (b) X-rays of the right knee revealed three thread-like foreign opaque bodies.

Fig. 4. Pieces of metal needle after extraction.

Fig. 5. The face (a) and profile (b) X-rays showed an opaque thread-like foreign body near to the internal femoral condyle in the soft tissue.
4. Conclusion

The traumatic impalement of pieces of metal needle in child's knee is a rare event. The circumstances of these accidents are often very difficult to reconstitute. The arthroscopy has an unquestionable advantage in the extraction of these foreign bodies. However the arthrotomy could be an interesting alternative in low-income countries due to failing technical support.

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Ethical approval

Ethical approval has been exempted by my institution for reporting these cases.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Eudes Ulrich Elvis Mahougnon GOUDJO: concept and design of study, data collection, drafting, revision, approval of final manuscript.
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Amoussou Sedjro Clotaire Romeo Houegban: design of study, revision, writing the paper, approval of final manuscript.
Houenouko Koco: design of study, writing the paper, approval of final manuscript.

Registration of research studies

Nil.

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Declaration of competing interest

Nothing to declare.

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Table 1
Summary of clinical cases.

| Case N°1     | Case N°2                  | Case N°3       |
|--------------|--------------------------|---------------|
| Age (years)  | 06                       | 08            | 05            |
| Sex          | Male                     | Female        | Male          |
| Mechanism of trauma | Intrusion of a needle in the knee by accident | Accidental crash of the knee against a chair in which a needle was encrusted | Not specified |
| X-ray        | Opaque thread-like foreign body | 03 opaque filiform foreigns bodies | Opaque thread-like foreign body |
| Side involved | Right                    | Right         | Left          |
| Complications | Nil                      | Osteoarthritis of the knee | Nil |
| Treatment    | Analgesics, serotherapy and tetanus vaccine, simple extraction from the soft tissue | Analgesics, serotherapy and tetanus vaccine, antibiotics, arthrotym and extraction, | Analgesics, tetanus vaccine, serotherapy, arthrotomy and extraction |
| Type of foreign body | Metal needle             | Pieces of metal needle | Metal needle |
| Duration of hospitalization (days) |                          |               |               |
| Evolution    | Stiffness of the knee then improvement afterwards | Uneventful | Uneventful |