

Symptomatic multipartite patella: imaging findings and pain relief. A description of two cases.

Case Report

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Abstract: Musculoskeletal injuries in the non-elite athletes are a clinical entity that is being seen more frequently nowadays. The term “weekend warriors” applies to amateur participants in sports activities and is related to an increasing number of musculoskeletal injuries mainly due to overuse. Concomitant skeletal variations may as well predispose to trauma. We add to the literature two cases of multipartite patella in which locally injected ropivacaine (ropivacaine hydrochloride) and steroid (betamethasone acetate-betamethasone sodium phosphate) relieved the symptoms completely. Here, we describe the clinical, imaging features and the course of treatment.

Keywords: Multipartite patella • Sports imaging • MRI • Local injection/therapy

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1. Introduction

Musculoskeletal injuries to the lower limb occur mostly in athletes who exert great forces on their legs. Soccer, running, cycling and a vast majority of other competitive sports are implicated in traumatic injuries of the lower skeleton [1-3]. Developmental skeletal anomalies and variants may also predispose to sports injuries especially in the untrained amateur participant [1-3]. The multipartite patella is a developmental variant in which the accessory ossification centers fail to fuse with the main body of the patella [4]. The bipartite type was first described by Gruber in 1883 and later in 1921 Saupe categorized the bipartite patella into three subgroups based on location of the fragments [4-5]. However, the Saupe classification has recently been reviewed and in 2010 Oohashi *et al.*, reported a larger series and presented a new classification of the multipartite patella developmental anomaly [5]. We add to the literature two cases of an uncommon multipartite patella type (supero-lateral and lateral type according to the Oohashi

classification) and describe the clinical and imaging findings together with the treatment applied.

2. Cases

Both patients gave their informed consent prior to being included in the study.

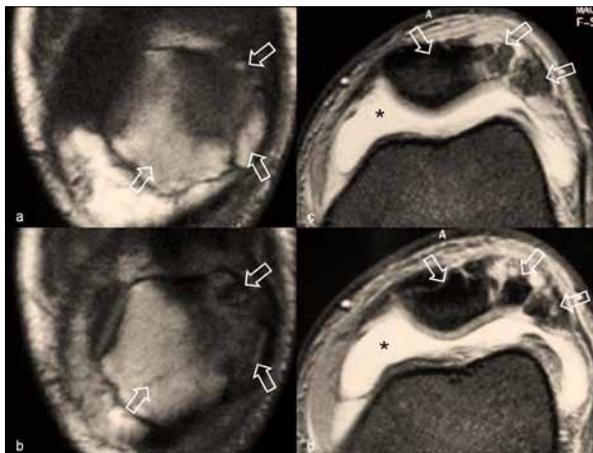
2.1. Case 1

A 44-year-old man, presented to the emergency department for evaluation of a left knee effusion. History revealed that swelling was first noticed 4 weeks before and the patient did not recall any major traumatic knee injury. The patient stated that he recently (3 months prior to admission) started mountain climbing and tracking during the weekends. Physical examination showed a painful knee effusion and the range of the knee-joint motion was severely restricted. No clinical or laboratory evidence of inflammation or infection were identified.

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Subsequent magnetic resonance imaging (MRI) study verified the presence of a large effusion of one knee and demonstrated presence of pseudoarthroses -synchondroses between the main patellar fragment and the non fused superolateral-lateral bony fragments (Figure 1). Bone marrow edema was also depicted. Relying upon clinical and radiographic findings, the clinicians have initially suggested a conservative treatment. Patient was cast- immobilized and provided with crutches for weight-bearing restriction, to be used for three weeks. A knee-brace was also advised to be applied for further 3 weeks. The patient was prescribed routine analgesic and anti-inflammatory drugs. Four weeks later, the patient removed the immobilization and ceased the weight-bearing restriction. Patient reported back with new onset of symptoms. Surgical therapy was proposed but the patient refused either internal stabilization or excision of the unstable bony fragments. Instead, two local injections of long acting analgesic (ropivacaine hydrochloride, 2mg/ml) and steroid (betamethasone acetate-betamethasone sodium phosphate, 3mg/ml), were given within 2 weeks together with new casting and weight-bearing restriction. Each injection contained total volume of 11ml solution composed of 10ml ropivacaine hydrochloride 0.2% and 1 ml of betamethasone acetate-betamethasone sodium phosphate 0.3%. The patient was completely relieved of pain and regained full knee function at 3 weeks follow-up. However, sports activities were banned for an additional period of 8 weeks. Six months after the initial presentation patient was still asymptomatic on everyday activities but reported transient pain and discomfort after strenuous activities.

Figure 1. The coronal (a), (b) T1-w and the axial (b), (d) fat suppressed PD-w magnetic resonance (MR) images demonstrate the presence of a tripartite patella (open arrows). Note associated bone marrow edema, reactive prepatellar soft tissue edema and the presence of high signal across the synchondroses. Knee effusion is marked with asterisks.



2.2. Case 2

A 34-year-old male patient presented with knee discomfort and localized pain over the superior pole of the left patella. According to his medical history the pain initiated three weeks ago during his first tennis-training lesson. No history of recent or remote knee trauma was reported. A radiographic examination demonstrated fragmentation of the superolateral patellar pole (Figure 2). Consequent ultrasound and MR examinations verified the presence of a multipartite patella with associated bone marrow edema, knee effusion and partial quadriceps tendinopathy (Figure 3-4). The patient was treated with a local injection of long acting analgesic

Figure 2. The anteroposterior (a), lateral (b), lateral-oblique (c) and tangential view (d) radiographs show fragmentation of the superolateral-lateral patellar pole.

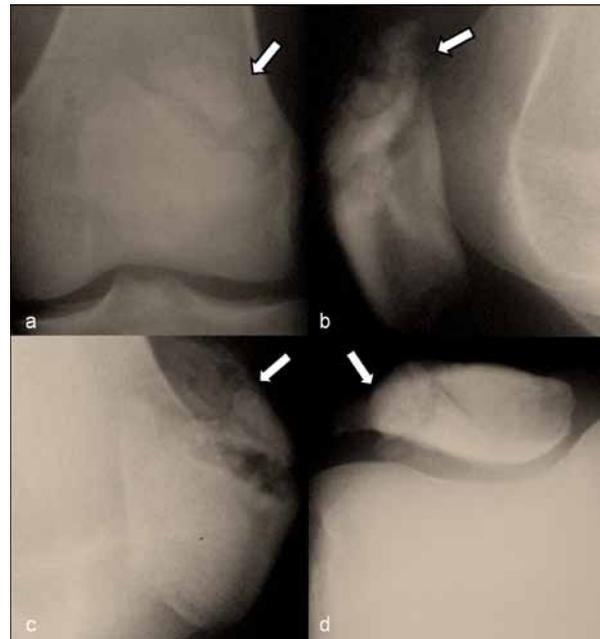


Figure 3. The transverse (a), (b), (c) and the longitudinal oblique (d) ultrasound images demonstrate fragmentation of the superolateral-lateral patellar pole (in dashed line) and hypoechogenicity of the vastus lateralis insertional tendon fibers (asterisks).

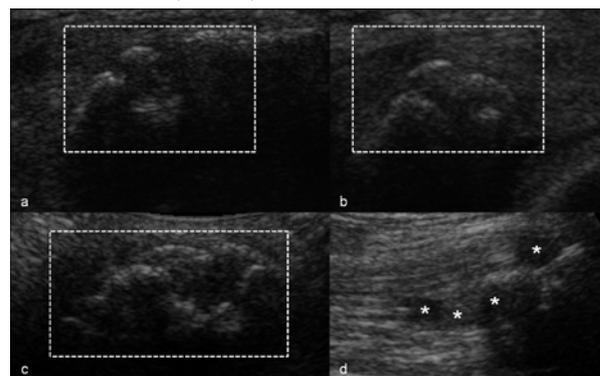
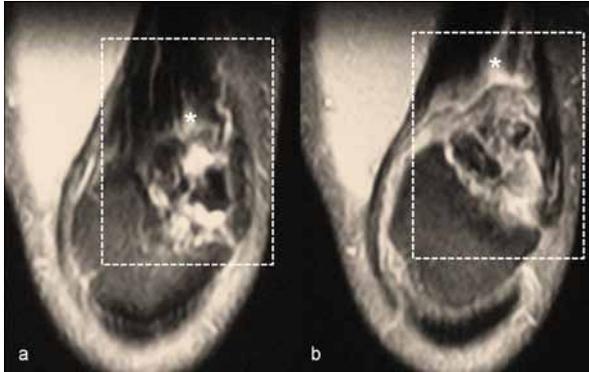


Figure 4. The coronal (a), (b) fat suppressed PD-w MR images verify fragmentation of the superolateral-lateral patellar pole (dashed line) and chronic tendinopathy of the vastus lateralis insertional tendon fibers (asterisks).



(ropivacaine hydrochloride, 2mg/ml) and steroid (betamethasone acetate-betamethasone sodium phosphate, 3mg/ml) targeted at the superolateral patellar pole. A total volume of 11 ml injection containing 10ml ropivacaine hydrochloride 0.2% and 1ml of betamethasone acetate-betamethasone sodium phosphate 0.3% was given. Weight-bearing support with crutches was also recommended, to use for further three weeks. At 48h post local injection the patient was completely symptom free. Although he is currently pain free in daily activities (four months after admission), the patient decided not to participate in any sport activities for the time being.

3. Cases discussion

Multipartite patella (bipartite, tripartite) is a developmental variation in which the peripheral, accessory ossification centers fail to fuse with the main body of the patella (main ossification center). This skeletal variant has been reported as a cause of anterior knee pain and symptomatology [4-6]. Although it is usually asymptomatic, overuse injuries or acute knee trauma may result in disruption of the synchondrosis-pseudarthrosis. The bony fragments may become mobile and unstable, causing friction and subsequently the development of edema [4-6]. In our patients the clinical history of recent sport activities provided useful information for the diagnosis. The repeated knee flexion and extension during mountain climbing or the strenuous tennis exercise seems to have elicited the symptoms. The absence of any recent or remote traumatic knee injury was also contributing factors in the correct diagnosis.

The most commonly encountered patellar variant is the bipartite type and has been reported to be more common in males than females by a ratio of 9:1 [4-7]. In 1921, Saupe has classified this skeletal variation into three subgroups depending on the location of the

fragments. This classification scheme has recently been questioned for a number of reasons and the tripartite patella type, as in our cases, cannot be explained according to this categorization [4-8]. In 2010, Oohashi *et al.*, proposed a new classification of the multipartite patella into four subgroups [5]. This classification is being used also empirically in our department prior to surgical planning. The identification and location together with the number and dimensions of the bony fragments provides valuable information regarding the surgical treatment and planning. Excision or stabilization of the painful peripheral ossicles can be decided and planned more effectively in comparison to the previously used categorization, which relies solely on the location of the bony fragments.

Our study strengthens the newly proposed classification and provides additional data regarding the ultrasound and MRI features of this uncommon multipartite patella type. Although MRI is not the method of choice to diagnose a variation in bone deformity, it is considered the imaging modality of choice to diagnose overuse syndromes [9-10]. Kavanach *et al.*, have described the MRI scans of bipartite patella and concluded that bone marrow edema within the bipartite fragment was the only result of knee MRI in almost half of the patients in their series [6]. Similarly in our cases bone marrow edema was depicted in the opposing bony fragments, probably due to motion-friction or impaction during sports activity. They also reported that high signal can be demonstrated in T2-w sequences across the bony segmentation, typical for a pseudoarthrosis [6]. We were also able to depict bright fluid-like signal across the bony segmentations, which are indicative of pseudoarthroses-synchondroses. This information provided additional evidence of the unstable-mobile nature of the peripheral fragments. In biomechanical terms, it was suggested that the lateral retinaculum and vastus lateralis exerted forces upon the peripheral ossicles during knee motion, which may result in symptomatology and pain.

The painful multipartite patella can be treated conservatively or surgically [4,11]. The initial treatment is non-surgical, consisting of restraint of activity and temporary immobilization. Surgery is only advised in complicated cases where conservative treatment have failed to relieve the symptoms and either excision or stabilization of the unstable bony fragments could be applied [4-11]. In the first case, the patient's non-compliance with the initial treatment and his refusal of a surgical therapy directed us to apply a different therapeutic scheme. Two local injections of long-acting analgesic and steroid, were given as reported before, within 2 weeks together with the new casting and weight-bearing restriction.

Percutaneous injections have been used successfully for pain management for many years in a number of musculoskeletal painful conditions [12]. In our second patient only one injection was required for treatment of symptoms. Regarding the applied therapeutic scheme, the use of ropivacaine instead of lidocaine or bupivacaine for guided injections is preferred in our hospital since ropivacaine has been shown to be less toxic to chondrocytes than the other two analgesics [13-15]. Thereby, possible risks of inadvertent intraarticular leakage into the patellofemoral joint could be minimized. Furthermore, unintentional intratendinous cortisone injection is known to occasionally result in tendon rupture [11-15]. For that reason, we have applied local injections between the bony fragments, in the fibrous tissue of the pseudarthroses and ultrasound was used to visualize the injection site, thus providing a safe treatment without the risk of tendon injury.

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In summary, hereby we presented two cases of multipartite patella, describing the clinical and imaging characteristics and the applied treatment. Further studies are needed to establish the newly proposed classification mentioned above and larger scale series should be carried out in order to elucidate the efficacy of percutaneous injection of long acting analgesics and steroids as a first line therapeutic option.

Conflict of interest

None declared

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