

MR Imaging of Lipohaemarthrosis in Knee Joint

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[Received : 19/07/2013, Accepted : 01/09/2013]

Abstract

Joint effusion constitutes a common post-traumatic finding. However presence of lipohaemarthrosis is indicator of intra-articular extension of fracture. Though a trivial finding, joint effusion in knee joint speaks of many secrets.

To determine the relationship between intra-articular extension of the fracture and presence of lipohaemarthrosis.

MR Images of 150 knee joints were reviewed retrospectively. MRI performed for patients with history of trauma were included and others were excluded. Each case was reviewed for presence of lipohaemarthrosis with associated intra-articular fracture. Presence of statistically significant association was confirmed.

Out of 150 cases, 11 cases had intra-articular fracture with associated lipohaemarthrosis.

Keywords: MR imaging, Knee joint effusion, lipohaemarthrosis, intra-articular fracture.

Introduction:

Joint effusions constitute a common finding after sports injuries. They can be an indirect trauma sign on conventional X-rays in case of intra-articular fractures, which is especially helpful if the cleft between the fragments is not visible.

However, the constitution and therefore the diagnostic value of joint effusions vary. Serous or sanguineous effusions alone tend to be non-specific, whereas lipohaemarthrosis, the presence of lipid material and blood, is very accurate for an intra-articular fracture penetrating the cartilaginous parts of the joint. In this study we are attempting to establish the relationship between lipohaemarthrosis in the knee joint with presence of intra-articular extension of the fracture.

Materials and Methods:

MR Images of 150 knee joints were reviewed retrospectively. Knee MRI done for patients with trauma was included and others were excluded. Each case was reviewed for presence of lipohaemarthrosis with associated intra-articular fracture. Lipohaemarthrosis was evaluated on axial and sagittal sections of proton density images as well as T2 weighted images done on GE SIGNA-HDxt 1.5 tesla MR imaging system. Corresponding sections were also reviewed on T2WI with fast spin echo sequences. Presence of associated

intra-articular extension of the fracture was also seen in most of the cases.

Results:

Amidst 150 Knee MRI, 10 patients had lipohaemarthrosis in which 8 patients had intra-articular extension of the fracture. 1 patient had intra-articular extension of the fracture but there was no lipohaemarthrosis.

On applying chi square test, statistical significance was confirmed between Lipohaemarthrosis and intra-articular extension of the fracture (p value=0.001).

Sensitivity of the lipohaemarthrosis in detection of intra-articular fracture is 88.8%, specificity- 98.6%, positive predictive value- 80% and negative predictive value is 99.3%.

Lipohaemarthrosis showed an efficiency of 98% in detecting intra-articular extension of fracture.

Discussion:

Lipohaemarthrosis results from the extrusion of fat and blood from bone marrow into the joint space after an intra-articular fracture. This was first described by Kling in 1929¹. Lipohaemarthrosis is more common in knee fractures, especially those affecting the tibial plateau, but it has also been described in shoulder, elbow, and hip fractures²⁻⁴.

Three bands can normally be distinguished : As the fat floats on the associated blood, the top band constitutes fatty material. The following band below is composed of serum and serous joint effusion. The cellular parts of the blood, i.e., erythrocytes and leukocytes, sediment due to

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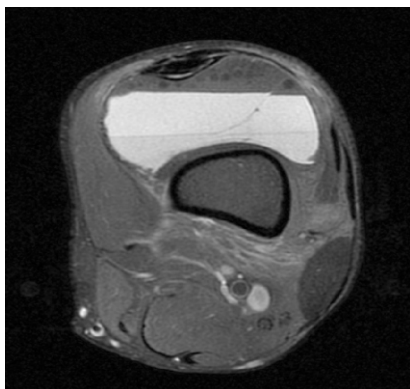


Fig 1: Axial proton density MR image. A double-fluid level is visible. Note the low signal intensity of the highest layer, which is comparable to surrounding fatty tissue. A high-intensity band follows and consists of serum. Cellular parts of blood have sedimented and display an intermediate signal.

gravity and form the lowest band⁵.

Serous or sanguineous effusions alone tend to be non-specific, whereas lipohaemarthrosis, the presence of lipid material and blood, is very accurate for an intra-articular fracture penetrating the cartilaginous parts of the joint⁶.

Lipohaemarthrosis can be found in approximately 40%⁷ of all intra-articular fractures of the knee and evolves at the latest 3 h after the trauma⁸; however, gravity and a certain time of rest are needed to depict the characteristic double fluid-fluid layer, which is characteristic of lipohaemarthrosis^{9,10}.

Conclusion:

With this study we conclude that there is a strong association between the presence of lipohaemarthrosis and intra-articular extension of the fracture. Presence of lipohaemarthrosis should make a radiologist over conscious and should look for associated intra-articular fracture

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Fig 2: Sagittal T2 weighted MR images. A characteristic three-layered appearance with varied signal intensities are seen in the knee joint. Fracture of the upper end of the tibia is noted with extension of the fracture line to the articular surface.

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How to Cite this article :

Bhagwat KA, Rajagopal D, Desai RS. MR Imaging of Lipohaemarthrosis in Knee Joint. *J Pub Health Med Res*, 2013;1(2):95-6

Funding: Declared none

Conflict of interest: Declared none