

I. M. Lang
D. G. Hughes
J. B. Williamson
S. G. W. Gough

MRI appearance of popliteal cysts in childhood

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I. M. Lang (✉)
Department of Radiology,
Wythershawe Hospital,
Southmoor Road,
Manchester M23 7LT, UK

I. M. Lang · D. G. Hughes
Department of Radiology, Hope Hospital,
Stott Lane, Salford, Manchester M6 8HD,
UK

J. B. Williamson · S. G. W. Gough
Department of Orthopaedic Surgery,
Royal Manchester Children's Hospital,
Pendlebury, Manchester, UK

Abstract Popliteal cysts are soft fluid-filled lesions of synovial origin which result from extrusion of joint fluid into the gastrocnemiosemimembranous bursa. They may occur in any age group, but 22–33 % occur in the first 15 years of life. In this age group they are rarely associated with intraarticular abnormalities and therefore rarely require treatment. This case report shows the magnetic resonance imaging (MRI) appearances of a popliteal cyst in two children.

Case report

Case 1

An 11-year-old girl presented with a 1-year history of swelling at the back of the right knee which had gradually been increasing in size. There was no history of trauma, but she occasionally had pain after heavy exercise. On examination there was a 5 × 5 cm cystic swelling posterior to the right knee. A radiograph of the knee was unremarkable. The MRI scan showed a posteromedial cyst extending from the posterior knee joint between the medial head of the gastrocnemius and the semimembranous muscle (Fig. 1 a, b). It extended superficial to the gastrocnemius and contained a plica in its proximal portion. No treatment is to be carried out at the current time, and the patient is to be reviewed in 6 months.

Case 2

A 5-year-old boy presented with a 4-week history of a non-tender swelling behind the right knee. There was no history of trauma. On examination there was a small 2 × 2 cm smooth swelling posterior to the right knee joint associated with the insertion of the medial hamstrings. MRI showed a posteromedial cyst which extended between the medial head of the gastrocnemius and the semimembranous muscle. It extended deep and superficial to the gastrocnemius and superficial to the semimembranous muscle.

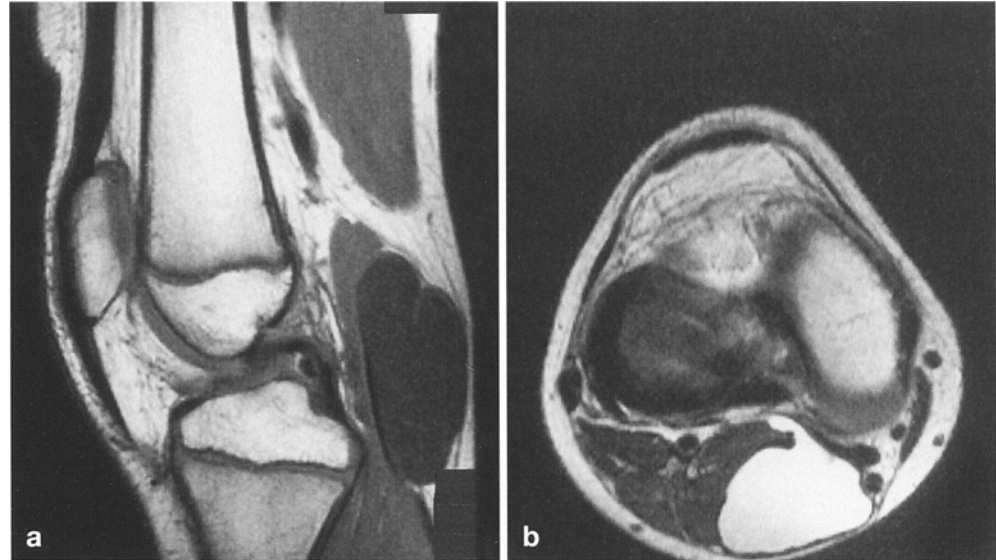
The diagnosis was discussed with the family and no treatment is to be carried out.

Discussion

Popliteal cysts in children are relatively frequent and were mentioned in the literature as early as the mid-nineteenth century. Despite this, several prominent textbooks on paediatrics and paediatric surgery make no reference to them [1]. Clinically, children usually present with an asymptomatic mass posterior to the knee joint, and the differential diagnosis includes benign or malignant soft tissue tumours and vascular lesions.

Popliteal cysts are lined with synovium. They result from extrusion of joint fluid into the gastrocnemiosemimembranous bursa through a weak portion of the posteromedial capsule of the knee between the medial head of gastrocnemius and the semimembranous muscle. This consistent anatomical feature helps distinguish popliteal cysts from other cystic masses in the knee [2]. Popliteal cysts can extend medial, lateral, deep or superficial to the semimembranous or gastrocnemius muscle. Their prevalence increases with age and in association

Fig. 1 **a** T1-weighted (SE 630/15) sagittal scan and **b** T2-weighted (TurboSE 3500/17) axial scan of the right knee showing a cystic lesion between the semimembranous muscle and the medial head of gastrocnemius. It contains a plica in its superior part



with a large number of underlying conditions including meniscal tears (usually posterior horn of medial meniscus), cruciate ligament tears (usually anterior cruciate ligament) and rheumatoid arthritis [3, 4].

In the past, plain films, sonography (US), arthrography and computed tomography (CT) have been used to evaluate popliteal cysts. US and CT are non-invasive and may be useful as an initial investigation for detecting fluid-filled structures and identifying cysts in atypical locations but cannot delineate associated ligamentous or meniscal pathology. MRI is as safe and as sensitive as US or CT in identifying popliteal cysts. It is less invasive and as accurate as arthrography in identifying associated injuries. MRI's ability to image the knee joint in several planes and to visualise differences in soft tissue contrast, allowing the integrity of all components of the knee, including intraarticular structures, to be determined, makes it ideal for evaluating knee joint masses in children. MRI is important if the clinical symptoms or signs, or US appearance of the cyst are atypical. On MRI popliteal cysts usually appear as well-defined fluid collections with few septa. They have low signal on T1-weighted and high signal on T2-weighted sequences. Haemorrhage, loose bodies or debris within the cyst may be seen [2].

The differential diagnosis includes: cysts arising from intraarticular ganglia or menisci; soft tissue tumours, benign or malignant; lesions that mimic cysts, such as synovial chondromatosis; vascular lesions such as popliteal vein varix [5]. Popliteal cysts in children are usually idiopathic and uncommonly associated with intraarticular lesions, which is not the case in adults [4].

The absence of any associated intra-articular lesion in children increases the likelihood of external trauma being involved in the pathogenesis of popliteal cysts. Gristina and Wilson hypothesize that a child seated in a

chair incurs injury to the popliteal fossa by repeatedly swinging the lower leg against the front edge of the seat [6]. This motion causes irritation and subsequent distension of the gastrocnemiosemimembranous bursa. A higher incidence of the lesion is seen in 5- to 6-year-old children, whose feet dangle rather than touch the floor. Studies where the cysts have been surgically removed in children have demonstrated histological evidence of acute and chronic inflammation and thickening of the bursa by dense fibrous connective tissue in approximately half of the patients [1].

The treatment of these cysts should be distinguished from their management in adults. The high incidence of associated intraarticular abnormality in adults necessitates careful pre-operative evaluation of the knee joint which should include MRI examination. The asymptomatic child with a medially or centrally located cyst is almost certain to have a swollen gastrocnemiosemimembranous bursa, which is rarely associated with intraarticular lesions and rarely requires treatment. Spontaneous disappearance is common, and the post-operative recurrence rate is reported to be as high as 42% [7]. Surgery is indicated only if the cyst is large enough to restrict activity, is causing pain or is atypical on imaging. If surgery is planned then any associated knee pathology should be identified. MRI is the investigation of choice to exclude intraarticular pathology in these cases.

In conclusion, we report the MRI appearance of a popliteal cyst in two children. Such cysts differ from those in adults as they are rarely associated with intraarticular abnormalities and are often treated conservatively. MRI is important to exclude other pathologies, especially intraarticular lesions, if the clinical symptoms and signs or US appearance are atypical or if surgery is to be carried out.

References

1. Touloukiou RJ (1971) Popliteal cysts in childhood. *Surgery* 69: 629-632
2. Janzen DL, Peterfy CG, Forbes JR, et al (1994) Cystic lesions around the knee joint: MR imaging findings. *AJR* 163: 155-161
3. Baker ND (1991) Evaluation of popliteal cysts. *Rheum Dis Clin North Am* 17: 803-804
4. Fielding JR, Franklin PD, Kustan J (1991) Popliteal cysts: a reassessment using magnetic resonance imaging. *Skeletal Radiol* 20: 433-435
5. Burk DL, Dalinka MK, Kanal E, et al (1988) Meniscal and ganglion cysts of the knee: MR evaluation. *AJR* 150: 331-336
6. Gristina AG, Wilson PD (1964) Popliteal cysts in adults and children; review of 90 cases. *Arch Surg* 88: 357
7. Smith JB (1986) Knee problems in children. *Pediatr Clin North Am* 33: 1439-1456