Double Synovial Cyst of the Proximal Tibiofibular Joint Confirmed by MRI as a Cause of the Peroneal Tunnel Syndrome

Dvojitá synoviální cysta proximální části tibiofibulárního kloubu potvrzená MRI jako příčina syndromu peroneálního kanálu

H. I. PEĆINA[1], I. BORIĆ[1], T. C. PEĆINA[2], T. SMOLJANOVIĆ[3], M. PEĆINA[3]

[1] Department of Radiology Clinical Hospital "Sestre Milosrdnice", Zagreb, Croatia
[2] Department of Radiology Clinical Hospital Dubrava, Zagreb, Croatia
[3] Department of Orthopaedic Surgery School of Medicine University of Zagreb, Croatia

SUMMARY

The aim of this case report is to present an unusual double synovial cyst that arose from the proximal tibiofibular joint compressing the peroneal nerve in the peroneal tunnel and was unrecognized at the beginning. According to the review of literature back to 1891, only 62 cases of cysts originating from the proximal tibiofibular joint (PTFJ) have been described. We report a case of a 32 year old male patient who was admitted to the Department of Orthopaedic Surgery because of a classic peroneal tunnel syndrome of the left leg. On the lateral side of the proximal third of his left leg a tumefaction of 12 x 2.5 cm was visible. The sonography showed a characteristic image of the para-articular synovial cyst of the left knee. A surgical extirpation of the synovial cyst and decompression of the peroneal nerve in the peroneal tunnel were performed. PHD confirmed a classic synovial cyst. Postoperatively, the symptoms of the peroneal nerve compression disappeared. Three years after the first surgical intervention the patient was readmitted to the Department because of quite similar problems, only the neurological symptoms were less intensive than during the first admittance. This time the performed MR imaging showed a double synovial cyst originating from the proximal tibiofibular joint. The surgical treatment consisted of a total extirpation of both cysts including the narrow stalks of communication with the PTFJ. The joint was opened and a synovectomy was done using an electrocauter and a sharp curette. Regular check-ups were done every 6 months and twice during the control period of 4 years, as was the MR imaging control. MRI findings 4 years after the second surgical intervention were normal. Clinical findings after 7 years were normal and we are sure that the recidivation of the synovial cyst excluded. The MRI diagnostics was crucial for an adequate surgical treatment and the relief of the peroneal tunnel syndrome symptoms.
Key words: proximal tibiofibular joint, synovial cyst, peroneal nerve compression, MRI diagnostics

INTRODUCTION

Synovial cysts may occur in association with any synovial joint or synovial lined tendon sheath. A popular theory of cyst formation is that an increase in intra-articular pressure, perhaps due to active synovitis or joint injury, causes an outpouching of the joint capsule, which then herniates to form the synovial cyst. Cystic masses of the knee joint are commonplace in orthopaedics, whereas cystic masses originating from the proximal tibiofibular joint (PTFJ) are extremely rare (2, 6, 10, 13, 16). According to the review of literature back to 1891 (14), only 62 cases (Table 1) have been described. We report a case of an unusual double synovial cyst that arose from the PTFJ compressing the peroneal nerve in the peroneal tunnel. At the beginning the origin of the cyst wasn't recognized. After surgical extirpation of the cyst the neurological symptoms disappeared, but three years later the cyst reappeared approximately in the same place and in the same volume. The MRI showed the origin of the cyst from the PTFJ and a new surgical intervention was performed. Clinical and MRI postoperative follow up for 7 years after the surgery confirmed that the second surgical intervention was successful.

CASE REPORT

A 32 year old male, a graphics engineer by profession, was admitted to the Department of Orthopaedic Surgery due to classic symptoms of the compression of the common peroneal nerve in the peroneal tunnel of the left leg, with motoric symptoms such as incapability of dorsal flexion of the foot and sensory symptoms such as paresthesia especially in the thumb area. On the lateral side of the proximal third of his left lower leg there was a visible tumefaction, i.e. a mass 12 cm in proximal distal length and 2,5 cm in diameter. The skin above the mass looked normal. A pressure applied to the mass intensified the symptoms of pain and paresthesia in the foot. A standard radiogram of the knee and lower leg was normal. A sonography revealed a characteristic para-articular cyst with no evidence of communication with the knee joint. A surgery was performed to com-

Table 1. Literature review of patients with synovial cysts originating from the proximal tibiofibular joint

References	Year	No. of cases
Lennander19	1891–1892	1
Ferguson 9	1937	1
Brooks4	1952	1
Kaplan15	1961	1
McEvedy21	1962	2
Stack et al.27	1965	3
Stener28	1969	1
Muckart 23	1976	5
Barrie et al.2	1986	3
Groulier et al.12	1987	1
Lee et al.18	1987	1
Burk et al.5	1988	1
Anderson and Sogard 1	1990	2
Evans et al. 8	1994.	1
O'Rourke and Byrne 24	1995	1
Bianchi et al.3	1995	6
Damron and Rock6	1997	12
De Schrijver et al.7	1998	3
Gayet et al.10	1998	1
Kelm et al. 17	1998	1
Gibbon et al.11	1999	1
Jerome and McKendry14	2000	1
Pecina et al.26	2000	1
Pagnoux et al.25	2002	3
Hersekli et al.13	2004	3
Kapoor V et al. 16	2004	2
Mortazavi et al.22	2006	3
Total		**62**

pletely remove the mass the contents of which proved to be characteristic for a synovial cyst. The diagnosis of a synovial cyst was also confirmed by the pathohistological findings. The peroneal nerve was exposed proximally to the peroneal canal and followed into the canal itself by a dissection of the tendon arch of the peroneus longus muscle. The point where the peroneal nerve forks into n. peroneus profundus, n.peroneus superfitialis and a recurrent branch was determined. The wound was closed in layers. Postoperative recovery was normal. The patient went through a physical therapy and recovered completely in 6 months, i.e. all the symptoms of the compression of the common peroneal nerve disappeared. The patient came for regular check ups and his condition was normal until the third year after the complete extirpation of the synovial cyst, when mild symptoms returned, specifically, only sensory symptoms of the compression of the peroneal nerve, and there was again a visible mass on the lateral side of the left lower leg, almost identical in size (although somewhat bigger in diameter) to the mass extirpated 3 years before. A standard radiogram showed no changes on bones, a sonography again produced results characteristic for a synovial cyst, but there was still no proof of a communication with the knee joint. A cystography was done, by injecting a contrast into the cyst itself, which made us suspect a communication between the cyst and the PTFJ. The MRI was done in all three planes (axial, coronal and sagittal) using different sequences with and without paramagnetic contrast media (gadolinium contrast). An MRI of the knee and the lower leg showed a double synovial cyst in communication with the PTFJ (Fig 1). Contrast-enhanced coronal T1-weighted MR image with fat suppression showed a multilobulated, septed synovial cyst with peripheral rim enhancement and compression of the common peroneal nerve at the level below the fibular head. The synovial cyst extended through the head of the fibula in the PTFJ (Fig.2). Contrast-enhanced axial T1-weighted MR image with fat suppression showed (arrows) compression of the common peroneal nerve at the level below the fibular head with a multilobulated, septed synovial cyst with peripheral rim enhancement (Fig. 3). Supported by the MRI results, the surgical procedure was this time precise and revealed two synovial cysts. One was in the fibres of m. peroneus longus connected proximally with the PTFJ by a 12 mm long stalk along the fibular bone. The other part of the synovial cyst was among the fibres of the m. peroneus longus, m. peroneus brevis and triceps surae and was also connected by a 12 mm long stalk along the tibial bone with the PTFJ. Both cystic masses were removed together with their stalks and sent for a pathohistologi-

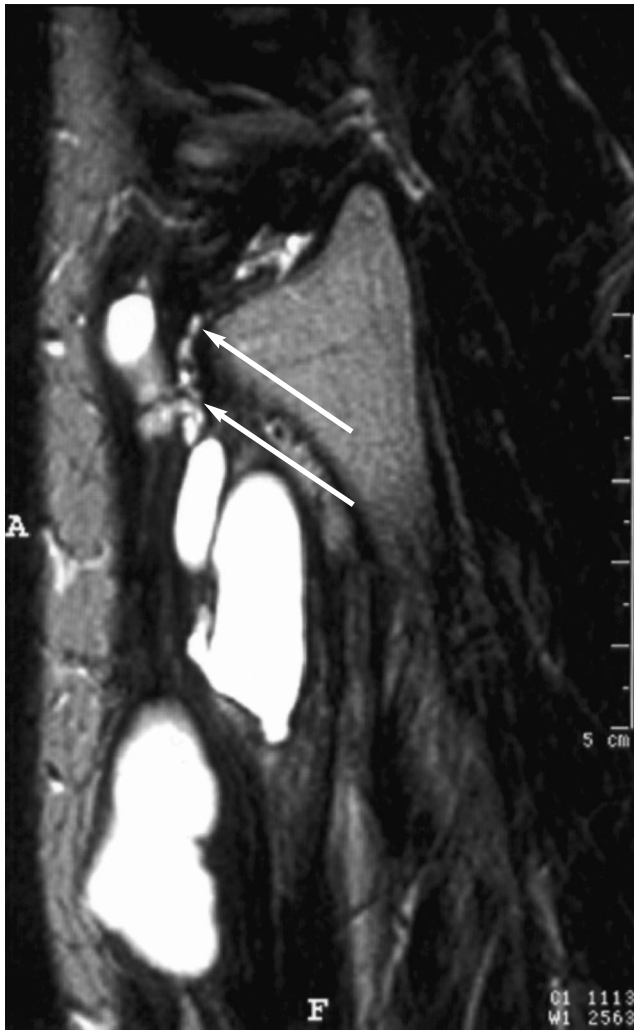

Figure 1. Preoperative MRI findings: sagittal T2-weighted MR image with fat suppression shows two multilobulated, septed cysts and stalk along the surface of the fibular bone (arrows) into the proximal tibiofibular joint.

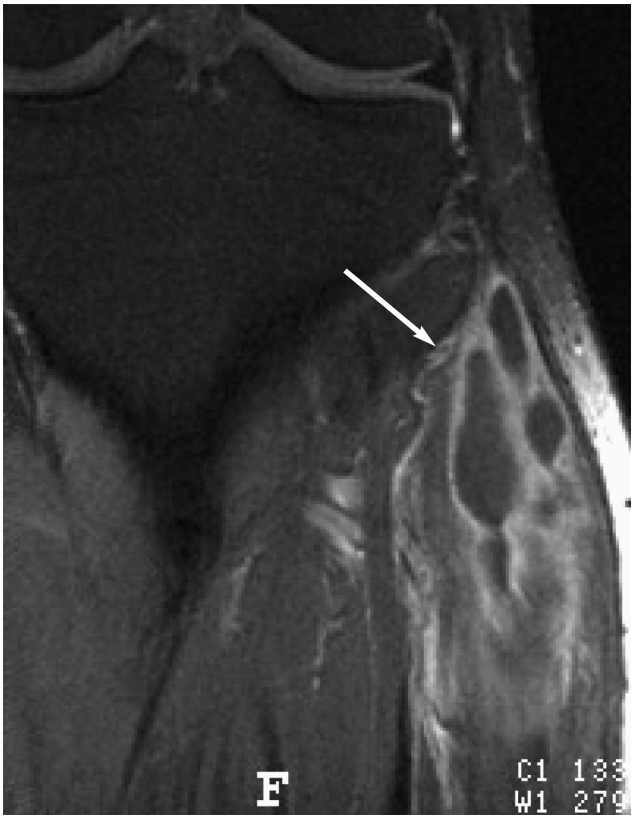

Figure 2. Contrast-enhanced coronal T1-weighted MR image with fat suppression shows a multilobulated, septed synovial cyst with a peripheral rim enhancement and compression of the common peroneal nerve at the level below the fibular head (arrow). Synovial cyst extends through the head of the fibula in the proximal tibiofibular joint.

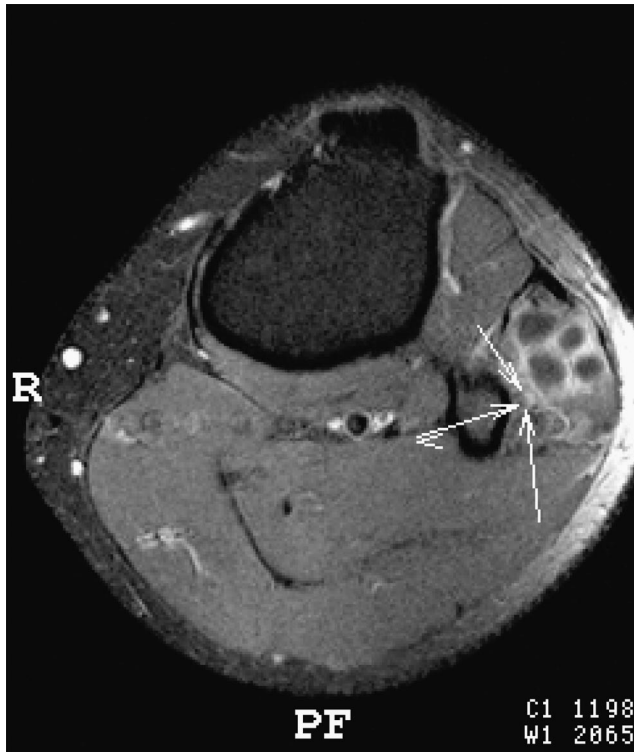

Figure 3. Contrast-enhanced axial T1-weighted MR image with fat suppression shows (arrows) compression of the common peroneal nerve at the level below the fibular head with a multilobulated, septed ganglion with a peripheral rim enhancement.

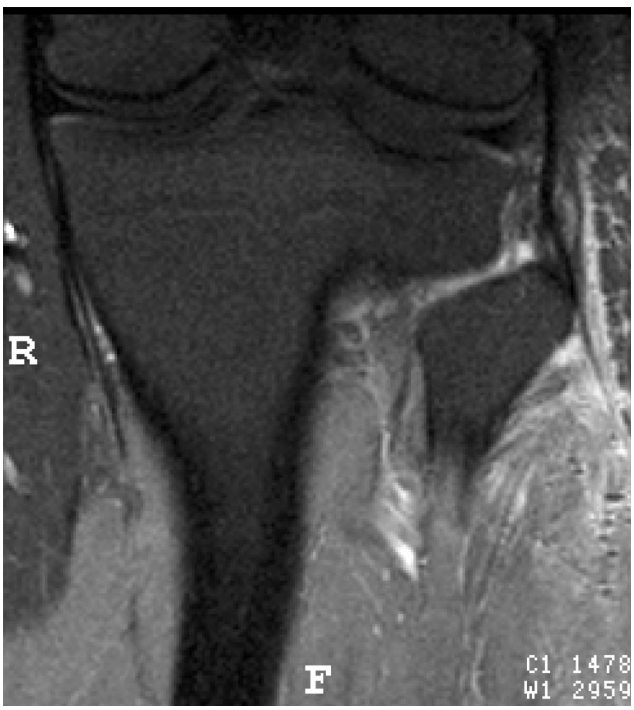

Figure 4. Post operative (12 months) control contrast-enhanced coronal T1-weighted MR image with fat supression shows a small amount of fluid in the proximal tibiofibular joint without any signs of synovial cyst recurrence.

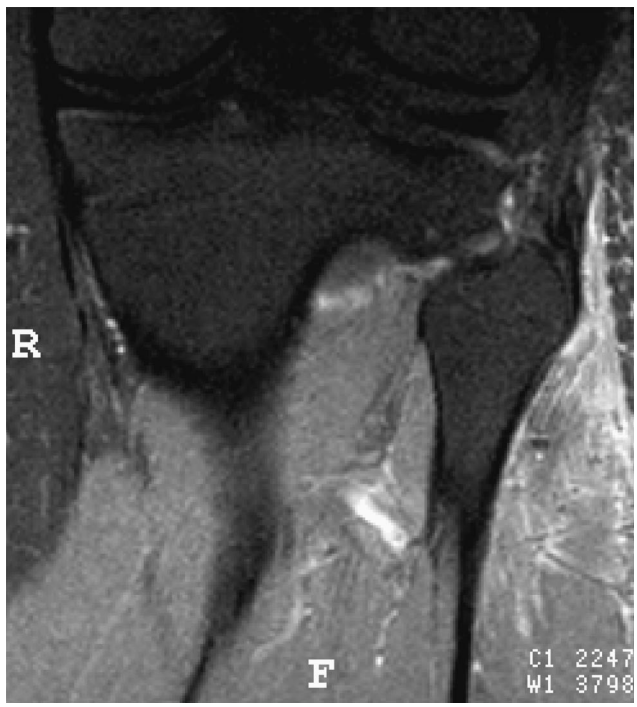

Figure 5. Postoperative (4 years) control contrast-enhanced coronal T1-weighted MR image with fat supression shows fibrous tissue in the proximal tibiofibular joint without recurrence of the synovial cyst.

cal analysis which confirmed the diagnosis of a synovial cyst. The PTFJ was then exposed and a synovectomy was done using an electrocauter and a sharp curette. Following lavage the joint capsule was not closed, only the fascia, subcutis and cutis were sutured. The postoperative progress was normal. Bearing in mind the prior experience of the synovial cyst recurrence, the patient came for regular check ups. All his clinical tests were normal, nevertheless, during the period of 4 years a control MRI was done twice. The first postoperative (12 months after surgery) control contrast-enhanced coronal T1-weighted MR image with fat suppression showed a small amount of fluid in the PTFJ without any signs of synovial cyst recurrence (Fig. 4). The second postoperative (4 years after surgery) control contrast-enhanced coronal T1-weighted MR image with fat suppression showed fibrous tissue in the PTFJ without signs of synovial cyst recurrence (Fig. 5). The patient was monitored for 7 years after the second surgery and we believe that we can exclude the possibility of the recurrence of the synovial cyst of the PTFJ.

DISCUSSION

The pathophysiology of synovial cysts is not well-understood but we believe in the theory that increased synovial fluid production secondary to trauma or arthritis may cause a distension of the synovial bursa or herniation of the distended capsule, and that this process may be responsible for the formation of synovial cysts (10, 11, 15). In contrast to this theory, a stalk was found between the cyst and the joint in only 20–50 % of the patients (16). We believe that, as was the case in our patient during the first surgical intervention, the stalk between the cyst and the PTFJ was overlooked both during the preoperative diagnostic tests and during the surgical procedure of cyst extirpation. The aim of our case report is not to discuss the pathophysiology of synovial cysts of the PTFJ, but to focus on the importance of the diagnosis and a proper treatment of synovial cysts of the PTFJ. It is known that over 50 % of presented cases of cysts of the PTFJ are linked with peroneal nerve palsy due to the compression of the common peroneal nerve in the peroneal canal (1, 7, 8, 9, 10, 17, 19, 20), which was also the case in our patient. In our patient a compression neuropathy of the common peroneal nerve occurred. It was characterized by anterolateral leg and dorsal foot pain, followed by progressive weakness of the peroneal innervated anterior compartment musculature and, finally, a complete peroneal nerve palsy presented with a foot drop, which has been reported by several other authors (5, 11, 21).

Based on our experience in the diagnosis of the cysts of the PTFJ, we agree with the opinion of the authors who claim that the best imaging method for the diagnosis and differential diagnosis of the synovial cysts of the PTFJ is MRI. It provides the best images for understanding the anatomical relationships of the cyst with its surrounding structures (4, 5, 15, 18, 19). If there is a stalk between the cyst and the joint, it is possible to detect it by an MRI. The proximity of the cyst to the peroneal nerve is also best visualised by an MRI, as we can see in our Fig. 2 and 3.

MRI is also of crucial significance in the differential diagnosis of the synovial cysts of the PTFJ. The differential diagnosis of the cysts of the PTFJ includes juxtaarticular or intramuscular myxoma, solid peripheral nerve tumours with cystic degeneration (schwannoma or neurofibroma) or synovial sarcoma. In our experience the MRI is of crucial significance in the operative planning. In our patient we performed the first surgical intervention of complete extirpation of the synovial cyst not knowing that there was a communication between the cyst and the PTFJ, because we did not do an MRI. 3 years later, the cyst reappeared, and medical publications state that the recurrence rate of surgical resection is less than 10 % (5, 12, 16). Bianchi et al. (3) noticed four recurrences in six resected cysts of the PTFJ during the follow-up time of a few months to 3 years. The most important step to avoid recurrences seems to be a complete resection of the cyst stalk (16), as we did during the second surgical intervention in our patient. We also did a synovectomy of the PTFJ using an electrocauter, but we did not completely close the joint capsule, because it was technically impossible. Control postoperative MRIs showed that the synovial membrane of the PTFJ regenerated, the synovial fluid in the joint was normally produced and there was no possibility of the synovial cyst recurrence. In our patient we also showed how important it is, during the excision, to decompress the peroneal nerve in the peroneal canal. When the synovial cyst reappeared 3 years after the first surgical excision of the cyst and decompression of the peroneal nerve, the new cyst, identical in size to the first one, caused minimal peroneal nerve compression symptoms since the nerve was freed from the peroneal canal during the first surgical intervention. The importance of an MRI in the diagnostics and postoperative planning can be clearly seen in the case of our patient in whom the MRI revealed two synovial cysts of the PTFJ. Each cyst had its own stalk to the joint, which was confirmed intraoperatively. For a successful surgical procedure with no recurrence it was important to completely extirpate both the cysts and resect their stalks. In the available medical publications we have not found any record of two synovial cysts of the PTFJ with preoperatively and intraoperatively confirmed stalks to the joint. The complete extirpation of the cyst and its stalk followed by a sinovectomy of the PTFJ is a procedure that we would recommend, based on our experience. We would also recommend a surgery under pneumatic tourniquet to ensure a bloodless and well visualized surgical area, which allows detection of the stalk between the cyst and the joint and protects the peroneal nerve. We recommend the decompression of the peroneal nerve in the peroneal tunnel, even if there are no neurolocal symptoms. In our patient the neurological symptoms recovered after the first surgical intervention, but in some cases they persisted without a recurrence of the cyst after the surgical intervention (10).

CONCLUSION

In the treatment of the synovial cyst of the PFTJ a complete surgical removal of the cyst is the best treatment method, followed by the resection of the stalk between the cyst and the PTFJ to prevent the recurrence. The existence of neurological deficit requires an urgent surgical intervention, as soon as the diagnosis is made. MRI is an effective and non-invasive method for the evaluation of synovial cystic lesions and is of crucial significance in the operative planning.

ZÁVĚR

Práce popisuje případ neobvyklé dvojité synoviální cysty vycházející z proximálního tibiofibulárního kloubu, která zpočátku zůstala nerozpoznána jako příčina komprese peroneálního nervu. V literatuře bylo od roku 1891 popsáno pouze 62 případů podobných cyst. Zde popisujeme případ muže stáří 32 let, který byl přijat na Kliniku ortopedické chirurgie s klasickým syndromem zúženého peroneálního tunelu na levé noze. Na boční straně v horní třetině končetiny bylo zjevné zduření velikosti 12 × 2,5 cm. Ultrazvukovým vyšetřením byl prokázán charakteristický obraz paraartikulární synoviální cysty levého kolena. Cysta byla chirurgicky odstraněna s dekompresí peroneálního nervu a histopatologický nález odpovídal klasické synoviální cystě. V následujícím období byl pacient bez obtíží. Tři roky po primárním zásahu byl znovu přijat na stejnou kliniku s potížemi obdobnými, i když ne tak intenzivními. Tentokrát byl pacient vyšetřen magnetickou rezonancí (MR) a byla prokázána dvojitá synoviální cysta vycházející z proximálního tibiofibulárního kloubu. Došlo k exstirpaci obou cyst včetně stopek spojujících je s proximálním tibiofibulárním kloubem. Kloub byl otevřen a synovektomie byla provedena s použitím elektrokauteru a ostré kyrety. Pacient přicházel na kontrolní vyšetření každých 6 měsíců a během čtyř let byl dvakrát vyšetřen magnetickou rezonancí. Za 4 roky po druhém zákroku byl MR nález v normě. Protože 7 let po operaci byl klinický nález negativní, recidiva synoviální cysty byla vyloučena. Závěrem lze říci, že diagnóza stanovená na základě vyšetření MR byla zásadní pro další operační postup, který odstranil symptomy zúženého peroneálního tunelu.

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Prof. Marko Pećina, M.D., Ph.D.,
Department of Orthopaedic Surgery,
Salata 7,
10000 Zagreb
Croatia
Tel: +385 1 48 18 833
Fax: +385 1 48 18 810
E-mail: marko.pecina@zg.t-com.hr

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