British Journal of Plastic Surgery (1993), **46**, 303–306

BRITISH JOURNAL OF PLASTIC SURGERY

Treatment of chronic recurrent synovial fistulae with myofascial flaps

M. A. Méndez-Fernández

Northern California Plastic Surgery Medical Group, Inc. and Mercy Medical Center, Redding, California

SUMMARY. **Chronic recurrent synovial fistulae of the knee are uncommon. They can occur as a surgical complication or as a consequence of traumatic injuries. Conservative treatment is usually adequate for initial management, but no consensus exists about the treatment for chronic or recurrent cases and the literature on the subject is scarce.**

Two cases are presented in which initial conservative and subsequent conventional surgical management failed and reconstruction with regional myofascial flaps was required.

Synovial fistulae of the knee are rare.[1–7] They can occur as a spontaneous complication of rheumatoid arthritis[2] after trauma, infection[1] or as a complication of different surgical procedures such as Baker's cyst removal,[2] arthroscopy,[4,5] hemarthrosis or chronic synovitis.[6] They have also occurred following suture reactions or stitch abscesses.[7]

Three stages of synovial problems may be produced secondary to arthrotomy or injury to the knee. These are: subcapsular herniation (where the synovia herniates through the capsule), fat pad herniation through the capsule, and the development of a synovial sinus. The latter may develop when excess synovial fluid forces its way through the defect; the sinus tract then allows joint fluid to squirt through the opening during knee flexion and muscle contraction.[3]

Being such uncommon entities, experience regarding their treatment is limited and, therefore, the literature on the subject is scarce. A very thorough search for the period between 1972 and 1991 produced only seven significant references[1–7] with a total number of nine cases reported.[1,2,4,5] A survey done with a questionnaire based on surgeons' recall revealed 30 cases of synovial fistulae resulting from 118 590 arthroscopic procedures. Seventy percent of these responded to immobilisation, but no mention was made of the management of the other 30%.[5]

The general consensus is that a sinus track should be treated with immobilisation with the leg straight and compression for a period of 7–14 days.[3,5,6,7] Persistence of a fistula beyond 2 weeks usually requires surgical excision and closure.[3,5,6,7]

Our interest in the subject and this paper were stimulated by two patients with this problem who were treated successfully.

Case reports

Case 1

A 34-year-old man sustained closed fractures of his right tibia and fibula. Because of failure of closed treatment, he underwent nailing of his tibia with Ender rods 4 months later. Nineteen months later, because of pain, the rods were removed, and one of the wounds used for this was complicated with infection and dehiscence; the wound healed by secondary intention after several weeks.

Soon after that the patient presented with a right knee septic arthritis and underwent arthroscopic incision and drainage. Culture revealed *Staphyloccus aureus*, for which he received 6 weeks of antibiotic treatment.

Two months later he returned with continuing infection of the knee and a synovial fistula. Conservative treatment (antibiotics, immobilisation and compression) failed to heal the fistula, and surgical excision of the fistula and closure was performed. Two weeks later, the fistula recurred and plastic surgery consultation was requested (Fig. 1).

After adequate drainage of the knee joint and antibiotic coverage, re-excision of the fistulous tract and coverage with a lateral gastrocnemius myofascial flap and split-thickness skin graft were performed (Figs 2, 3, 4).

The wounds healed uneventfully, and 6 months later, he was healed, functional and without recurrence.

Case 2

A 64-year-old female with oxygen-dependent chronic obstructive pulmonary disease, diabetes mellitus and atherosclerotic peripheral vascular disease sustained a closed comminuted fracture of the right patella. Open reduction and internal fixation were performed, but this surgery was complicated with infection of the prepatellar bursa with *Staphylococcus epidermidis*. This was managed with incision and antibiotics.

One month later, she presented with an open wound and purulent drainage. A patellectomy was done, and she recovered uneventfully, only to return 6 weeks later with a synovial fistula that failed to respond to conservative management (Fig. 5). Plastic surgery intervention was requested and after several days of aggressive wound care and systemic antibiotics, the fistula was excised and reconstruction with a medial gastrocnemius myofascial flap and split-thickness skin graft was accomplished (Fig. 6). Wounds healed without further complications, and the patient resumed ambulation without further recurrence of the fistula (Fig. 7).

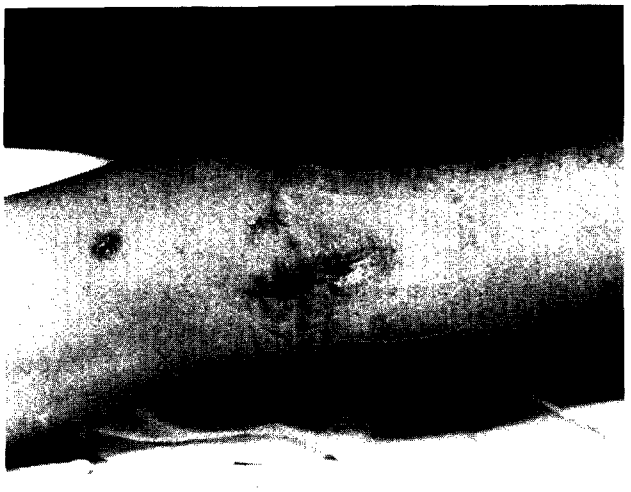

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Figure 1—*Case 1.* Preoperative view of the recurrent lateral synovial fistula. **Figure 2**—Intraoperative view demonstrating the defect after excision of the fistula. **Figure 3**—Intraoperative view. Notice the fascial portion of the flap. **Figure 4**—Postoperative view before discharge from the hospital.

Discussion

Most orthopaedic surgeons, based on their individual anecdotal experience, believe that synovial fistulae heal with conservative management. This is reflected in the existing literature on the subject.

The two cases presented here represent failures of this principle and required alternative aggressive surgical treatment. Common features of these cases were traumatic injury, infection and initial surgical treatments that failed.

In the presence of a chronic, recurrent synovial fistula in which conservative management and later surgical repair have failed, commonsense, the knowledge of the properties of muscle, myocutaneous and fascial flaps[8–11] and positive previous experiences with their use for the treatment of similar conditions[12 15] indicated that this would be a reasonable solution.

Principles of treatment should include adequate drainage of the joint beyond the time of reconstruction, appropriate antibiotic treatment for an adequate length of time, and obliteration of the defect with similar well-vascularised autologous tissue (fascia) (Fig. 8).

Two important technical aspects are the identification and complete excision of the fistulous tract (this can be accomplished by retrograde injection of methylene blue) and the water-tight tensionless closure of the defect with vascularised fascia. A split-thickness skin graft is required to cover the muscle portion of the flap.

Acknowledgements

Thanks to Billie S. White, Medical Librarian and C.M.E. coordinator at Mercy Medical Center, Redding, California, for the bibliographical search.

The typographical assistance of Irene Coley is gratefully appreciated.

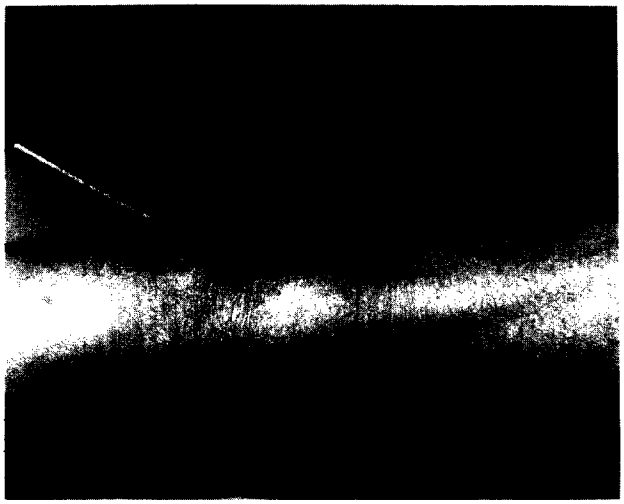

Fig. 5

Fig. 6

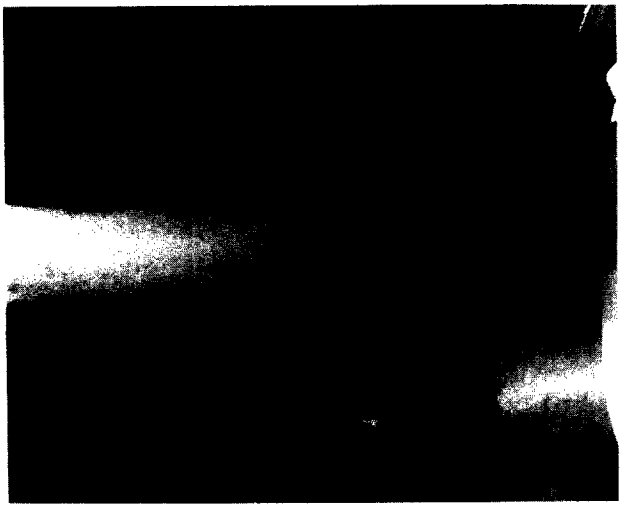

Fig. 7

Figure 5 - *Case 2.* Preoperative view. The Q-tip highlights the depth and direction of the fistula. **Figure 6**—Intraoperative view showing the medial gastrocnemius myofascial flap. **Figure 7**—One month postoperative view.

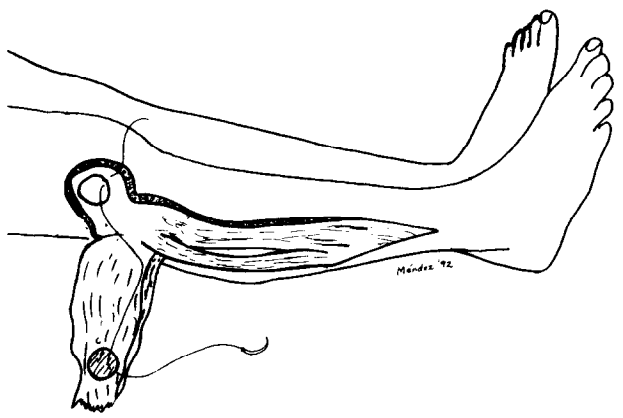

Fig. 8

Figure 8—Illustration of the lateral gastrocnemius myofascial flap. Notice the fascial island to repair the defect of the joint capsule.

References

1. Smason JB. Post-Traumatic Fistula Connecting Prepatellar Bursa with Knee Joint. J Bone Joint Surg 1972; 54-A: 1553-1554.
2. Bennett RM, Hughes GRV, Bywaters EGL, Holt PJL. Studies of a Popliteal Synovial Fistula. Ann Rheum Dis 1972; 31: 482-486.
3. Larson RL. Synovial Sinus. In: Epps CH, ed. Complications in Orthopaedic Surgery. Philadelphia: Lippincott, 1978: 511.
4. Hadied AM. An Unusual Complication of Arthroscopy: A Fistula Between the Knee and the Prepatellar Bursa. Case Report. J Bone Joint Surg [am] 1984; 66: 624.
5. Proffer DS, Drez D Jr, Daus GP. Synovial Fistula of the Knee: A Complication of Arthroscopy. Arthroscopy 1991; 7: 98-100.
6. Sisk TD. Knee Injuries. In: Crenshaw AH, ed. Campbell's Operative Orthopaedics. 7th ed. St. Louis: C.V. Mosby, 1987: 2283–2496.
7. Miller RH III. General Principles of Arthroscopy. In: Crenshaw AH, ed. Campbell's Operative Orthopaedics. 8th ed. St. Louis: Mosby Year Book, Inc. 1991: 1769-1786.
8. Mathes SJ, Alpert BS, Chang N. Use of the Muscle Flap in Chronic Osteomyelitis. Experimental and Clinical Correlation. Plast Reconstr Surg 1982; 69: 815–828.

9. Chang N, Mathes SJ. Comparison of the Effect of Bacterial Inoculation in Musculocutaneous and Random-Pattern Flaps. Plast Reconstr Surg 1982; 70: 1–9.
10. Mathes SJ, Feng LJ, Hunt TK. Coverage of the Infected Wound. Ann Surg 1983; 198: 420–428.
11. Eshima I, Mathes SJ, Paty P. Comparison of the Intracellular Bacterial Killing Activity of Leukocytes in Musculocutaneous and Random-Pattern Flaps. Plast Reconstr Surg 1990; 86: 541–547.
12. Méndez-Fernández MA, Quast DC, Geis RC, Henly WS. Distally-Based Sartorius Muscle Flap in the Treatment of Infected Femoral Arterial Prostheses. J Cardiovasc Surg 1980; 21: 628–631.
13. Méndez-Fernández MA, Hollan C, Frank DH, Fisher JC. The Scrotal Myocutaneous Flap. Plast Reconstr Surg 1986; 78: 676–678.
14. Méndez-Fernández MA. Uso de Colgajos Musculares y Miocutáneous para Tratar Prótesis Vasculares Expuestas. Cir Plast Ibero-Latino-Amer 1988; 14: 117–124.
15. Méndez-Fernández MA. Tratamiento de la Esternotomía Media Complicada. Cir Plast Ibero-Latino-Amer 1989; 15: 287–296.

The Author

Miguel Angel Méndez-Fernandez, MD. Plastic Surgery Associates of Redding, 2510 Airpark Dr., Suite 104, Redding, California 96001, USA.

Requests for reprints to the author.

Paper received 25 June 1992.
Accepted 2 November 1992, after revision.