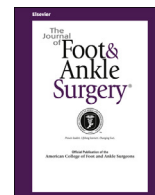


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Arthroscopy of the First Metatarsophalangeal Joint



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ABSTRACT

Arthroscopic treatments for the first metatarsophalangeal joint have not spread fully owing to a number of factors. First, in the common arthroscopic view, the joint is observed from above, which makes the structures difficult to grasp and the dorsal aspect of the joint difficult to visualize and treat. Second, techniques for widening the view have not yet been reported. Third, the portals necessary for observation and treatment with hallux sesamoids have not yet been established. Finally, techniques for detecting the sesamoids have not been previously reported. We have developed a method for first metatarsophalangeal joint arthroscopy by treating 14 patients with hallux rigidus and 9 patients with hallux sesamoid disorders. We report a new method that combines a variety of arthroscopic techniques. Our study has 4 novel points. First, in our arthroscopic technique, the joint can be examined from the medial side because traction is directly and horizontally applied to the great toe using an adjustable traction device with the surgeon standing on the unoperated side. The technique enables observation of the dorsal aspect of the metatarsal head and proximal phalanx and makes the structures easier to grasp. Second, the coagulator technique as an arthroscopic aid is demonstrated. Third, all aspects of the joint, including the sesamoids, can be observed through our 4 portals. Finally, techniques for detecting the sesamoids are identified. We believe our novel method will ensure that arthroscopy of the first metatarsophalangeal joint is easier than previously described methods.

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Watanabe (1) reported the first study describing arthroscopy of the first metatarsophalangeal joint in 1972. Subsequent to the technique of first metatarsophalangeal joint arthroscopy, Ferkel (2) described the first systematic arthroscopy in 1996. In addition, other investigators (3–8) who reported on systematic arthroscopy have used the method described by Ferkel. Many diseases have been treated arthroscopically, including osteochondritis dissecans (9,10), pigmented villonodular synovitis (11), hallux rigidus (12,13), hallux sesamoid disorders (14,15), free body (6), ganglion (16), arthrofibrosis (17,18), gouty tophi (19,20), hallux valgus (21–24), and hallux varus (25). However, only ~30 studies related to first metatarsophalangeal joint arthroscopy have been reported in the 40 years since the first (1–31). In addition, arthroscopic treatments of the first metatarsophalangeal joint have not spread fully for the following reasons:

1. In the common arthroscopic view described to date, the joint is observed from above (2–8). In this view, the structures are not easy to grasp. Moreover, the dorsal aspect of the metatarsal head and proximal phalanx cannot be observed to the extent that the hallux rigidus would be the most suitable for the arthroscopic treatment and, thus, cannot be treated well.
2. Observation of the first metatarsophalangeal joint is difficult because the joint is narrow and contains synovitis. Moreover, techniques for widening the view have not yet been reported.
3. The portals necessary for the observation and treatment of the hallux sesamoids have not been established. Furthermore, few studies have reported on the treatment of sesamoid hallux disorders (14,15).
4. For surgeons unaccustomed to arthroscopy of the first metatarsophalangeal joint, even detecting the sesamoids can be difficult, and techniques for detecting the sesamoids have not been reported.

In the present report, we describe a sequential, systematic examination of arthroscopy of the first metatarsophalangeal joint and a variety of techniques for arthroscopy. Furthermore, our methods solve each of the 4 problems outlined. We consider that our method will

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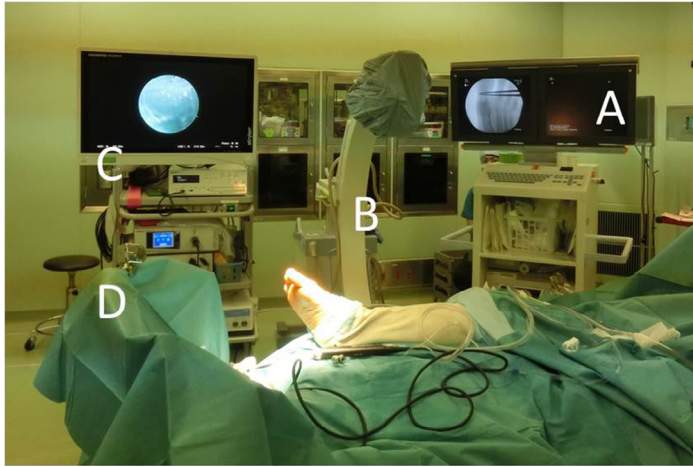


Fig. 1. Views of the operating room showing A, fluoroscopic monitor, B, fluoroscope, C, arthroscopic monitor, and D, transverse burr for traction. The surgeon stands on the unoperated side.

make arthroscopy of the first metatarsophalangeal joint easier than previously described procedures.

Surgical Technique

We developed our method of first metatarsophalangeal joint arthroscopy through the treatment of 14 patients with hallux rigidus and 9 patients with hallux sesamoid disorders.

The patient is positioned supine on the operating table, and a tourniquet is prepared. A fluoroscopy monitor, a fluoroscope, and an arthroscopy monitor are placed from proximally to distally along the operated side. A transverse burr for traction is placed at the end of the operating table (Fig. 1).

The surgeon stands on the unoperated side, and the positions for the portals are identified using the fluoroscope and marked with a surgical pen (Figs. 2 and 3). The first proximal phalanx is transversely drilled with a 1.6-mm Kirschner wire 5 mm proximally to the interphalangeal joint line. A 1.25-mm soft wire is passed through the hole. Both ends of the wire are crossed and twisted to create a ring. The hallux is wrapped in gauze so as not to be damaged by the wire.



Fig. 2. Dorsomedial and dorsolateral portals. These portals are marked at the edges of the first metatarsophalangeal joint. Note that the great toe is directly tracked by the soft wire.



Fig. 3. Proximal and distal sesamoid portals. These portals are marked just proximally and distally to the medial sesamoid.

The traction device is placed on the transverse burr at the end of the table. The hook of the traction device is hung on the ring and is used to apply traction to the hallux. The traction device we used is one used for thoracotomies (Kent Retractor®; Takasago Medical Industry, Co., Ltd., Tokyo, Japan); it can control the traction power applied.

A small incision is made longitudinally at the previously marked medial edge of the metatarsophalangeal (MTP) joint, and blunt dissection up to the capsule is performed. A 2.3-mm arthroscope is introduced through the portal into the joint. The dorsolateral portal is established with an 18-gauge needle under direct vision. A 2.5-mm coagulator is inserted from the dorsolateral portal to minimize hemorrhagic synovitis. The use of a shaver should be minimized because hemorrhage will worsen the view. The coagulator is also used to lift the soft tissue off to widen the view.

The inspection begins at the middle surfaces of the first MTP joint (Fig. 4), following the dorsolateral edge of the metatarsal head and reaching the dorsal surface (Fig. 5A). Behind the dorsal surface of the metatarsal head, the pouch and the reflection of the joint capsule can be observed (Fig. 5B). In cases of hallux rigidus, the space of the pouch is narrow because the dorsal osteophyte occupies the pouch. The coagulator lifting the capsule off the dorsal osteophyte allows for good visibility. Inspection continues until the dorsomedial surface of the metatarsal head can be visualized (Fig. 5C).

The arthroscope is returned to the starting view (Fig. 4), and inspection of the proximal phalanx begins at the lateral edge and continues to the medial edge (Fig. 6A). Behind the edge of the proximal phalanx, the pouch and the reflection of the capsule will be observed (Fig. 6B). In the case of hallux rigidus, the pouch will not be seen without lifting the capsule because the dorsal osteophyte interferes with the view. Inspection continues until the dorsomedial surface of the proximal phalanx is seen (Fig. 6C).

The arthroscope is again returned to the starting view. Next, the arthroscope is directed to the plantar aspect. In many cases, the plantar aspect of the joint will be difficult to visualize because of the synovitis. The synovitis is cleaned using the coagulator introduced from the dorsolateral portal. The meniscoid lesion (7) can be seen; however, in many cases, no meniscoid lesion will be present. The distal sesamoid portal is established with an 18-gauge needle placed under direct vision. The coagulator is extracted from the dorsolateral portal and

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