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Ankle Arthroscopy Equates Harmful Neurovascular Structures

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Abstract

Ankle joint pathology is increasingly being diagnosed and treated with arthroscopy.The anteromedial (AM), anterolateral (AL), posteromedial (PM), and posterolateral (PL) portals are the four most common ones for ankle arthroscopy. Additionally, the neurovascular structures (NVS) that run along the ankle can have very different anatomical features.To determine safe zones for the scope's insertion, the NVS's distance from the ankle arthroscopic portals' anatomical landmarks was compared.26 fresh-frozen cadavers were used for the dissection, which included NVS and standard anatomical landmarks.Using a 2.7 mm arthroscope, the portals were made and checked.When attempting to quantify a scope space, the antero-medial and anterior-lateral portals had the largest margins of error, with 0.82 and 1.04 cm, respectively.With the exception of the peroneus tertius and the intermediate dorsal cutaneous nerve (IDCN), the average distance between the saphenous nerve and vein and the antero-medial portal was 1.23 cm. The comparison of the mean distances between anatomic landmarks revealed significant differences (p = 0.181, all others p 0.0001).The tibialis anterior tendon averaged 1.10 cm lateral, the peroneus tertius tendon was 1.31 cm medial, and the Achilles tendon was 0.94 cm from the medial gutter.The anatomy of the anterior lateral portal varied the most, with the peroneus tertius tendon being 0.23 cm from the IDCN.To make it easier to see the anatomy on the lateral side, this data suggests installing the medial portal first before installing the anterolateral portal.

Keywords: Ankle arthroscopy; Portals; Anatomy; Safe zones

Introduction

Arthroscopy is increasingly being used to diagnose and treat pathology of the ankle joint. The four most common portals for ankle arthroscopy are anterior-medial (AM), posteromedial (PM), and posterolateral (PL). Because these are located close to neurovascular structures (NVS), they are immune to injury during inclusion.A recent meta-analysis found that complications ranged from 3.4% to 9% when using either the anterior or posterior portals [**1-4**]. The most common complications are those related to the nerve.In order to ensure consistent portal placement for ankle arthroscopy, the foot and ankle specialist should be familiar with all relevant structures and their relative distances from the ankle joint.

Previous research did not specify the distance between portal entry landmarks, but the distance between portal entry and neurovascular structures was evaluated [**5-6**]. Additionally, the author is aware that no previous reports have mentioned the ankle gutters. This study compared the distance of NVS from the four ankle arthroscopic portal landmarks in order to verify safe zones for scope insertion.

Materials and Methods

At the four ankle arthroscopic portals, 26 fresh-frozen cadavers' lower extremities were dissected. The Institutional Audit Board didn't have to support the utilization of cadaveric examples. At each portal, neurovascular structures were carefully dissected to reveal them without altering their original anatomical location. The anterior tendon of the tibia was inserted into the medial gutter to create the AM portal. The AL portal was inserted into the lateral gutter lateral to the peroneus tertius tendon; the PM was inserted into the medial gutter lateral to the Achilles tendon; and the PL were inserted into the medial gutter lateral to the Achilles tendon. At the level of the ankle joint, the distances that separated each anatomical landmark from the neurovascular structures were measured and recorded [7-9]. In addition, a lower leg degree of 2.7 mm was later added to guarantee the correct entrance size and accuracy. In order to maintain consistency and blindness, two additional researchers completed and reviewed all measurements. The dissections were carried out by the same two researchers [10].

Results

The dissimilar juxtaposition of neurovascular structures at each location. The most uniqueness happened between the peroneus tertius (AL entrance) and the IMDN, with a mean of 22.9 mm average, standard deviation of 81.4 mm, and scope of 30.0 mm. Komolgorov-Smirnov testing revealed that the saphenous nerve and the tibial dissemination front typically communicated. The AL portal is clearly surrounded by dispersed anatomy. For neurovascular structures, however, there was no significant difference in variance between gutters or landmarks.

In addition, the authors are aware that previous studies have not accurately estimated the distance between tourist destinations or the joint space in the lower leg. The distance between anatomical landmarks and the ankle gutter was measured in this study. The tibial anterior tendon was 1.10 cm lateral, the Achilles tendon was 0.94 cm, and the peroneus tertius tendon was 1.31 cm medial to the lateral gutter. To get the extension space (SS), divide these lengths by the degree breadth (4.0 or 2.7 mm). With 0.82 and 1.04 cm, respectively, the antero-medial and anterior-lateral portals had the largest SS for a 2.7 mm scope. However, there were no significant comparisons between the peroneus tertius and IDCN in terms of mean SS, so the medial portal website had the longest SS, which was statistically significant (p 0.0001). In theory, this portal website has the most space and therefore the most room for error.

The saphenous and sural nerves were approximately parallel to the Achilles tendon at 0.896 cm medially and 0.8923 cm laterally.

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Additionally, the localized SS of the posteromedial and posterolateral portals, which measured 0.67 cm and 0.46 cm, was smaller than that of the anterior portals.

Discussion

An important, minimally invasive method for diagnosing and treating numerous diseases is ankle arthroscopy. Compared to arthroscopy of other joints, lower leg arthroscopy is associated with a higher rate of neurovascular complications, necessitating the establishment of physical safe zones that correspond to the four gateways.

Similarly, Deng, et al. carried out a study in whichNeurological injury is the most common difficulty in lower leg arthroscopy, accounting for up to half of the 9 percent complexity rate. A physical problem with the shallow peroneal nerve is the most common complexity.14 nerve injuries were found in a meta-analysis of ten cadaveric studies on the risk of neurovascular and tendinous structures during ankle arthroscopy. The AL gateway was responsible for six of these wounds, ten of which were to the SPN. Based on these data, we hypothesized that the IDCN would be most susceptible to iatrogenic injury through the AL portal.

The wide range of distances between the SPN and the AL portal and the SPN's anatomical variation are well-documented in the literature.Scheibling and others, Buckingham and other individuals were measured at a distance of 0.5 2.5 mm. Woo and othersIn 35 dead bodies, we measured a distance of 1.8 1.25 mm between the AL entrance and the SPN and estimated it to be 5.5 3.5 mm. We anticipated a wide range of anatomical distributions for the distance between the IDCN and the AL portal.

A meta-analysis of ankle arthroscopy cadaveric studies found that the intermediate dorsal cutaneous nerve and tendinous structures are most susceptible to iatrogenic injury, and the measured values are comfortably within one standard deviation of those findings. The IMDN's slow location confirms that SPN injury is one of the most common ankle complications; however, this consistency may support the conventional method of initially creating the AM portal. Additionally, the discoveries support the method of making a front average entry first, followed by further developed perception of parallel life systems. The saphenous nerve and the tibialis anterior tendon had a bimodal relationship (mean 13.9 mm). Instead of being in the usual medial location, the IDCNs of five specimens were found lateral to the portal.The AL gateway's mean distance from the IDCN, which was 2.3 mm, was unquestionably significantly influenced by these variations. There may have been additional anatomical variations. The IDCN's erroneous identification as an undivided superficial peroneal nerve or medial dorsal cutaneous nerve is a new source of concern. As was mentioned earlier, the significant number of cadaveric specimens (n = 26) contributed to the statistical significance achieved through comparative analysis, despite the absence of variant branches of the perforating peroneal or anterior tibial arteries. This number is higher than the numbers in two newest reports with different outcomes.

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Conflict of Interest

The author has no known conflicts of interested associated with this paper.

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