

# Endoscopic Resection of Horseshoe Ganglion of the Lateral Midfoot



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**Abstract:** A ganglion is the most common soft-tissue mass in the foot and can cause pain, paresthesia, or footwear problems. A ganglion can extend from the dorsum into the plantar compartment of the foot in the form of a horseshoe at the borders of the foot or in the form of an hourglass through the intermetatarsal space. Initial conservative management of a ganglion may entail observation and the use of padding for comfort, manual rupture, aspiration of the cyst contents, and steroid injection or sclerotherapy into the cyst. When the lesion is recurrent or painful, surgical excision is recommended. The purpose of this Technical Note is to describe the details of endoscopic resection of a horseshoe ganglion of the lateral midfoot. This technique has the advantages of being minimally invasive, with better cosmetic results and less surgical trauma to the soft tissue.

The ganglion is a common mucin-containing cystic lesion that can affect the foot and ankle.<sup>1-4</sup> A ganglion can extend from dorsum into the plantar compartment of the foot in the form of a horseshoe at the borders of the foot or in the form of an hourglass through the intermetatarsal space.<sup>5</sup> Pain and mass effects associated with the lesions can make ambulation and wearing shoes difficult.<sup>1,4,6</sup> The ganglion also can lead to stress on soft tissues and pain, including compression on abutting local nerves, leading to paresthesia.<sup>4,7,8</sup> Initial conservative management of ganglion may entail observation and the use of padding for comfort, manual rupture, aspiration of the cyst contents, and steroid injection or sclerotherapy into the cyst.<sup>3,4,9</sup>

When the lesion is recurrent or painful, surgical excision is recommended.<sup>1</sup> Techniques of endoscopic

ganglionectomy of the foot and ankle have been reported.<sup>10-15</sup> In this Technical Note, we describe the details of endoscopic resection of a horseshoe ganglion of the lateral midfoot. This technique is indicated for symptomatic horseshoe ganglion of the lateral midfoot recalcitrant to conservative treatment. It is contraindicated if there is other pathology that demands open surgery or it is an intraneural ganglion or hourglass ganglion passing through the intermetatarsal space.<sup>5,16</sup> Intratendinous ganglion is a relative contraindication of this endoscopic procedure, as open repair of associated tendon tear may be needed (Table 1).<sup>7,17,18</sup>

## Surgical Technique

### Preoperative Assessment

On clinical examination, ballottement and transillumination of the horseshoe ganglion can be demonstrated (Fig 1). Preoperative magnetic resonance imaging is important to study the anatomical relationship between the ganglion and the tendinous and neurovascular structures and whether the ganglion is multiloculated (Fig 2).<sup>1</sup>

### Patient Positioning and Portal Placement

The patient is placed in a lateral position with a thigh tourniquet used to provide a bloodless operative field. A 2.7-mm 30° arthroscope (Henke Sass Wolf GmbH, Tuttlingen, Germany) is used for this procedure. Fluid inflow is driven by gravity, and an arthro-pump is not used.

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**Table 1.** Indications and Contraindications of Endoscopic Resection of a Horseshoe Ganglion of the Lateral Midfoot

Indications	Contraindications
1. Symptomatic horseshoe ganglion of the lateral midfoot recalcitrant to conservative treatment	1. There is other pathology that demands open surgery
	2. It is an intraneural ganglion
	3. It is an hourglass ganglion passing through the intermetatarsal space.
	4. Intratendinous ganglion is a relative contraindication.

The endoscopic procedure is performed via the dorsal and plantar portals, which are at the dorsal corner and most lateral side of the horseshoe ganglion, respectively (Fig 3). Three- to four-millimeter skin incisions are made at the portal sites. The subcutaneous tissue is bluntly dissected with a hemostat down to the ganglion. A plane is carefully developed between the ganglion and the overlying soft tissue by the hemostat, and this plane is the initial endoscopic working area.

**Endoscopic Resection of Dorsal Part of the Horseshoe Ganglion**

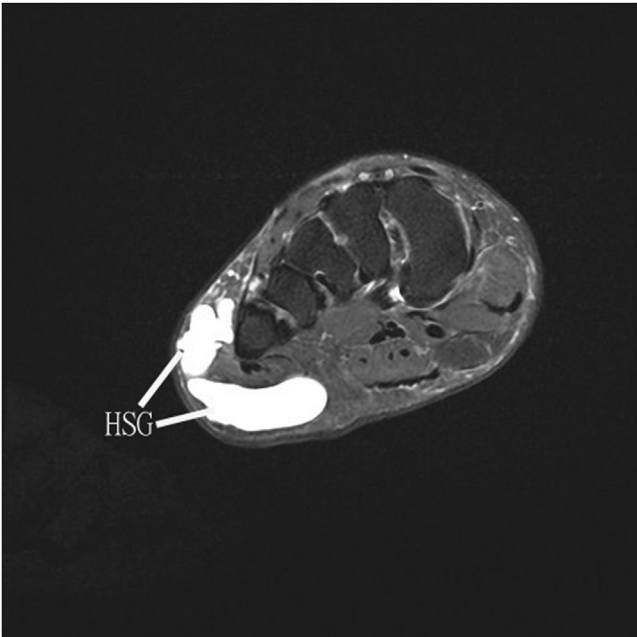
The plantar portal is the viewing portal and the dorsal portal is the working portal. The dorsal part of the horseshoe ganglion is resected with an arthroscopic shaver (DYONICS; Smith & Nephew, Andover, MA). The arthroscopic suction should be kept to a minimum, and caution should be paid to preserve the extensor tendons and cutaneous nerves, for example, the inter-medial dorsal cutaneous branch of the superficial peroneal nerve (Fig 4).

**Endoscopic Resection of Plantar Part of the Horseshoe Ganglion**

The dorsal portal is the viewing portal and the plantar portal is the working portal. The opening of the remaining plantar part of the horseshoe ganglion sac is

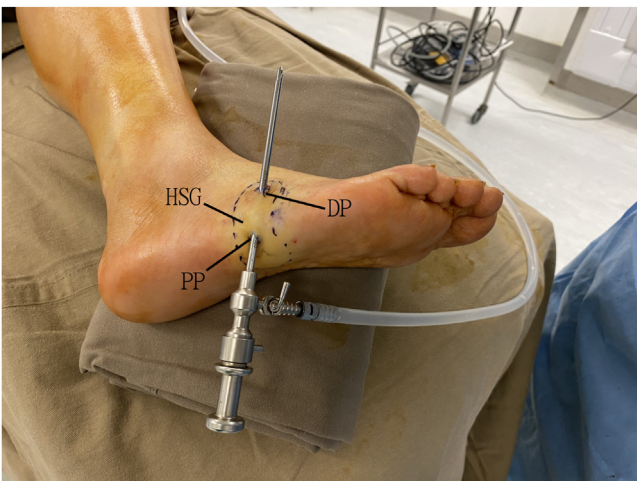


**Fig 1.** Endoscopic resection of horseshoe ganglion of the right lateral midfoot. The patient is in a lateral position. The clinical photo shows the horseshoe ganglion spanned from dorsal to plantar side of the lateral midfoot. (HSG, horseshoe ganglion.)

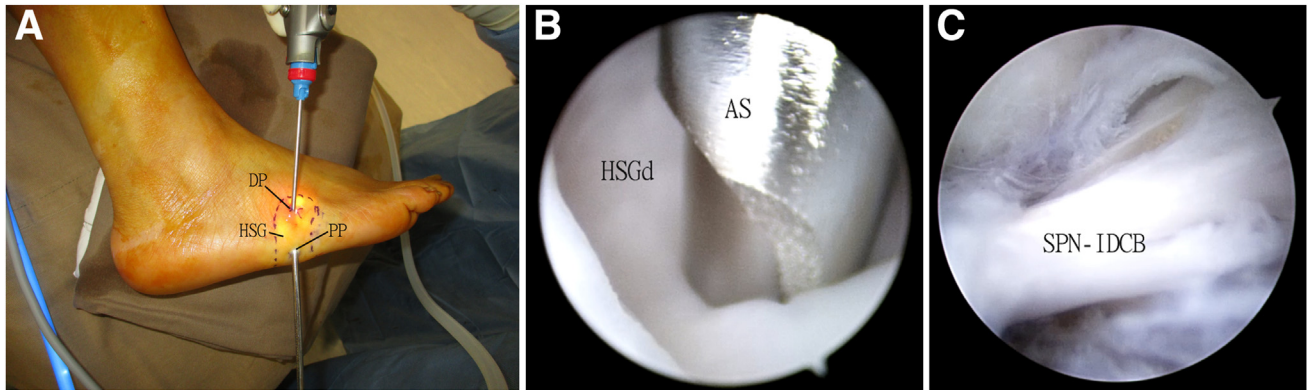


**Fig 2.** Endoscopic resection of horseshoe ganglion of the right lateral midfoot. The patient is in a lateral position. Magnetic resonance imaging shows the horseshoe ganglion spanned from dorsal to plantar side of the lateral midfoot. (HSG, horseshoe ganglion.)

carefully identified. After identification of this opening, the arthroscopic shaver is then inserted into the plantar ganglion sac via this opening. The plantar ganglion is then resected by the shaver from inside out. Caution should be paid to resect only the ganglion sac. The shaver should not work beyond this boundary to avoid



**Fig 3.** Endoscopic resection of horseshoe ganglion of the right lateral midfoot. The patient is in a lateral position. The endoscopic procedure is performed via the dorsal and plantar portals, which are at the dorsal corner and most lateral side of the horseshoe ganglion, respectively. (DP, distal portal; HSG, horseshoe ganglion; PP, proximal portal.)



**Fig 4.** Endoscopic resection of horseshoe ganglion of the right lateral midfoot. The patient is in a lateral position. (A) The plantar portal is the viewing portal and the dorsal portal is the working portal. (B) The dorsal part of the horseshoe ganglion is resected with an arthroscopic shaver. (C) The intermedial dorsal cutaneous branch of the superficial peroneal nerve is kept intact. (AS, arthroscopic shaver; DP, distal portal; HSG, horseshoe ganglion; HSGd, dorsal part of horseshoe ganglion; PP, proximal portal; SPN-IDCB, intermedial dorsal cutaneous branch of superficial peroneal nerve.)

the surrounding tendinous and neurovascular structure of the plantar foot (Fig 5, Video 1, Table 2). After the procedure, the portal incisions are closed with simple sutures, and compression dressing is applied for 2 to 4 weeks.

### Discussion

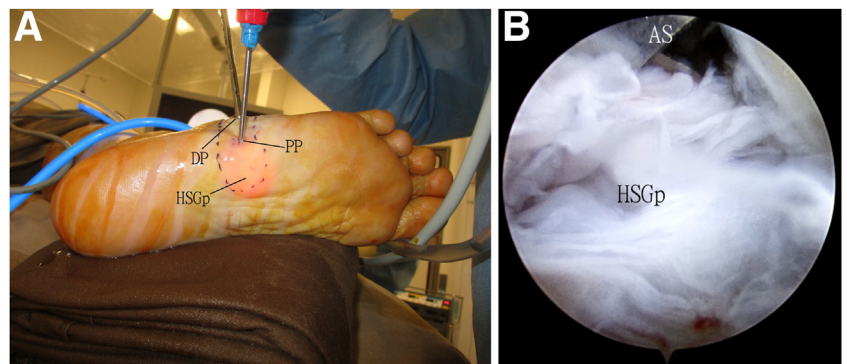
In this reported technique, the plantar portal is located at the most lateral side of the horseshoe ganglion rather than the plantar side of the horseshoe ganglion. If the plantar portal is made at the plantar side of the ganglion, a painful scar may form at the sole. Moreover, the portals cannot serve well as the viewing and working portals, as both the arthroscope and arthroscopic instruments cannot overcome the turning point of the horseshoe ganglion. Sometimes the cutaneous nerve branches, such as sural nerve or superficial peroneal nerve, may attach to the ganglion cyst wall.<sup>1</sup> In these cases, endoscopic dissection of the nerve branches from the cyst should be performed before endoscopic ganglionectomy.<sup>13</sup> If endoscopic nerve

dissection is impossible, the part of the ganglion cyst wall can be left untouched or the endoscopic procedure is converted to open surgery.<sup>13</sup>

This endoscopic technique has the potential advantages of small incisions and a better cosmetic result, minimal dissection, and reduced risk of fibrosis of the operative site. The potential risks of this technique include injury to the intermedial dorsal cutaneous branch of the superficial peroneal nerve, sural nerve or the extensor tendons, and incomplete resection of the ganglion and recurrence (Table 3). This procedure is not technically demanding and can be attempted by both experienced and inexperienced foot and ankle arthroscopists.

### Disclosures

All authors (S.Y.C. and T.H.L.) declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.



**Fig 5.** Endoscopic resection of horseshoe ganglion of the right lateral midfoot. The patient is in a lateral position. (A) The dorsal portal is the viewing portal and the plantar portal is the working portal. (B) The plantar part of the horseshoe ganglion is resected. (AS, arthroscopic shaver; DP, distal portal; HSGp, plantar part of horseshoe ganglion; PP, proximal portal.)



**Table 2.** Pearls and Pitfalls of the Endoscopic Resection of Horseshoe Ganglion of the Lateral Midfoot

Pearls	Pitfalls
1. The plantar portal should be made at the most lateral side of the horseshoe ganglion.	1. If the plantar portal is made at the plantar side of the ganglion, instrumentation via this portal cannot reach the dorsal part of the ganglion.
2. The arthroscopic suction should be kept into a minimum and the shaver blade should be visualized during endoscopic resection of the ganglion to reduce the risk of injury of the surrounding tendinous and neurovascular structures.	2. If the shaver works beyond this boundary of the ganglion sac, the surrounding tendinous and neurovascular structures may be injured.

**Table 3.** Advantages and Risks of Endoscopic Resection of Horseshoe Ganglion of the Lateral Midfoot

Advantages	Risks
1. Small incisions and better cosmetic result	1. Injury to the intermedial dorsal cutaneous branch of the superficial peroneal nerve
2. Minimal dissection and reduced risk of fibrosis of the operative site	2. Injury to the sural nerve
	3. Injury to the extensor tendons
	4. Incomplete resection of the ganglion and recurrence

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