Technical Note

# Arthroscopic Treatment of Bone Cyst of Anterior Half of the Talar Body

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**Abstract:** Large talar bone cyst can cause pathologic fracture and damage to the articular cartilage, resulting in persistent swelling and pain of the subtalar joint and ankle joint. For a symptomatic cyst not responding to conservative treatment, surgery can be considered. Open debridement and bone grafting frequently require extensive soft-tissue dissection or even different types of malleolar osteotomy for proper access to the lesion. Arthroscopic treatment of talar bone cyst is a feasible alternative minimally invasive approach to reduce surgical trauma and eliminate the need for osteotomy. Bone cyst of the anterior part of the talar body can be debrided via a bone window of the talar neck, which is normally devoid of cartilage. The purpose of this Technical Note is to describe the technique of arthroscopic treatment of bone cyst of anterior half of the talar body. This minimally invasive approach does not disrupt the normal articular cartilage of the talar dome.

Bone cysts of the talar body can be an incidental radiologic finding.[1] However, large talar bone cysts can cause pathologic fracture and damage to the articular cartilage, resulting in persistent swelling and pain of the subtalar joint and ankle joint.[1] For a symptomatic cyst not responding to conservative treatment, surgery can be considered. Many surgical approaches have been advocated to treat symptomatic bone cysts.[1-12] Because the majority of the talar surface is covered with articular cartilage, open surgical approaches to the talar bone cysts frequently require extensive soft-tissue dissection, malleolar osteotomy, and damage to the talar articular cartilage.[1,2] Arthroscopic treatment of talar bone cyst is a feasible alternative minimally invasive approach to reduce the surgical trauma and eliminate the need of osteotomy.[1-5,12] Bone cyst of the anterior part of the talar body can be debrided via a bone window of the talar neck which is normally void of cartilage.[3] This Technical Note describes the technique of endoscopic debridement and filling the cyst with injectable bone graft substitute. This minimally invasive approach does not disrupt the normal cartilage surface.[3,4] This is indicated for symptomatic large bone cyst of the anterior talar body. This is contraindicated if the cyst is at the posterior talar body or the cyst is just underneath a large osteochondral lesion (OCL) or there is significant osteoarthrosis of the ankle joint (Table 1).

## Surgical Technique (With Video Illustration)

### Preoperative Planning and Patient Positioning

Preoperative radiographs (Fig 1) and computed tomography (Fig 2) are important investigation for preoperative planning. Any communication between the OCL and the talar bone cyst should be studied to determine the possibility of creation of trans-OCL portal.[3] The position of the bone cyst at the anterior part of the talar body is confirmed.

A 2.7-mm 30° arthroscope (Henke Sass Wolf GmbH, Tuttlingen, Germany) is used. A thigh tourniquet is applied to provide a bloodless operative field. Fluid inflow is driven by gravity and no arthropump is used.

### Portal Placement

The procedure starts with ankle arthroscopy via the anteromedial and anterolateral portals, which are at the lateral side of tibialis anterior tendon and the medial

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**Table 1.** Indications and Contraindications of Arthroscopic Treatment of Bone Cyst of the Anterior Half of the Talar Body

| Indication | Contraindications |
|---|---|
| • Symptomatic large bone cyst of the anterior talar body. | • The cyst is at the posterior talar body<br>• The cyst is just underneath a large osteochondral lesion<br>• There is significant osteoarthrosis of the ankle joint |

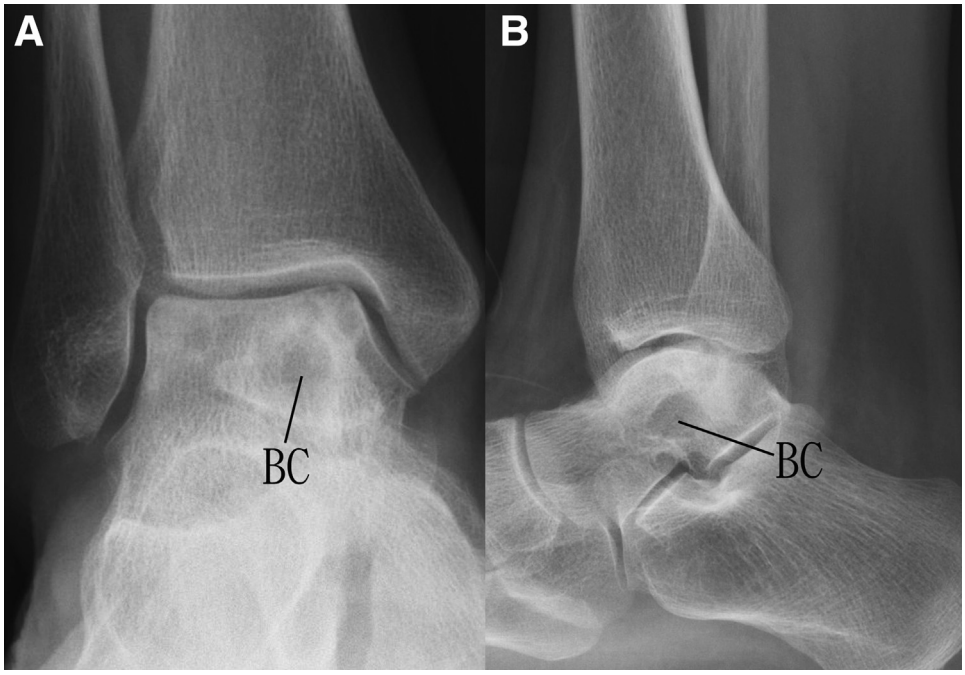


**Fig 1.** Arthroscopic treatment of bone cyst of anterior half of the talar body of the right ankle. The patient is in supine position. Preoperative radiographs of the illustrated case show the bone cyst at the anterior half of the talar body. (A) Anteroposterior view; (B) lateral view. (BC, bone cyst.)

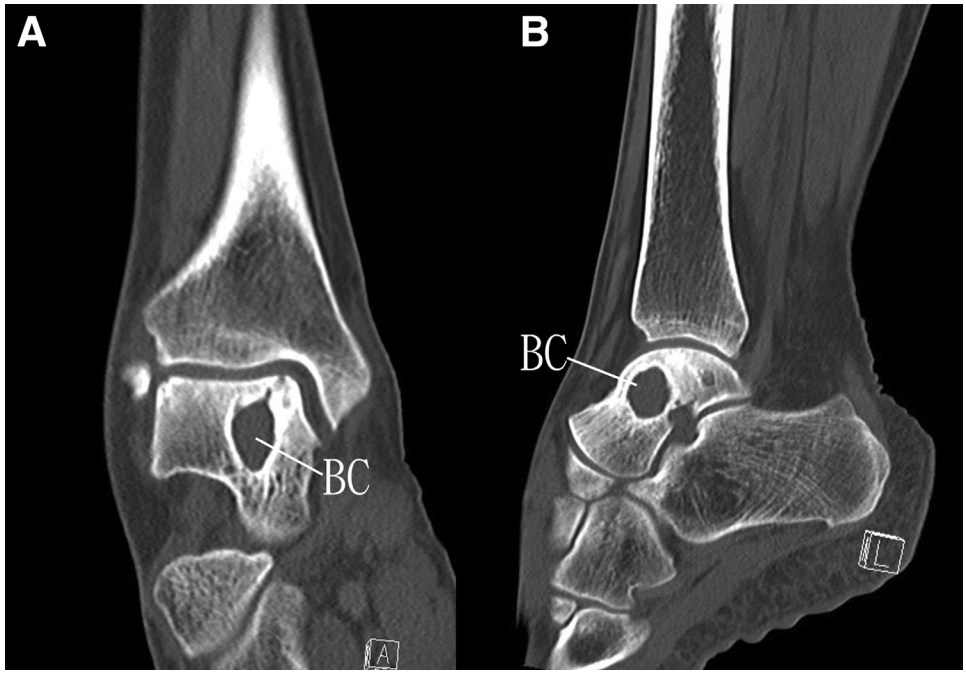


**Fig 2.** Arthroscopic treatment of bone cyst of anterior half of the talar body of the right ankle. The patient is in supine position. Preoperative computed tomogram images of the illustrated case show the location of the bone cyst at the anterior half of the talar body. (A) Coronal view; (B) sagittal view. (BC, bone cyst.)

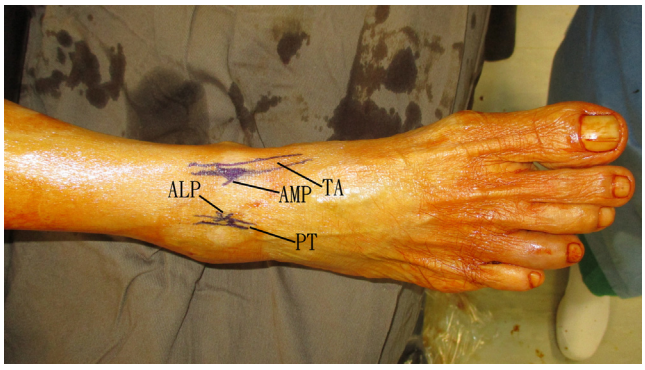


**Fig 3.** Arthroscopic treatment of bone cyst of anterior half of the talar body of the right ankle. The patient is in supine position. Ankle arthroscopy is performed via the anteromedial and anterolateral portals which are at the lateral side of tibialis anterior tendon and the medial side of peroneus tertius tendon respectively. (ALP, anterolateral portal; AMP, anteromedial portal; PT, peroneus tertius tendon; TA, tibialis anterior tendon.)

side of peroneus tertius tendon respectively (Fig 3).[5] Three- to four-millimeter skin incisions are made at the portal sites and the subcutaneous tissue is bluntly dissected down to the ankle joint capsule with a hemostat. The capsule is perforated by the tip of the hemostat.

### Debridement and Microfracture of the OCL

The anterolateral portal is the viewing portal and the anteromedial portal is the working portal. The ankle is plantarflexed to expose the OCL and the lesion is debrided with an arthroscopic probe (ACUFEX; Smith & Nephew, Andover, MA). The cartilage flap is removed with an arthroscopic punch forceps (ACUFEX; Smith & Nephew). Microfracture of the subchondral bone is performed with an arthroscopic awl (Smith & Nephew) (Fig 4).

### Creation of Bone Window at the Talar Neck

The anterolateral portal is the viewing portal and the anteromedial portal is the working portal. A 1.6-mm K wire (Zimmer, Warsaw, IN) is inserted into the ankle joint via the anteromedial portal. Under fluoroscopic guidance, the K wire is inserted into the bone cyst through the talar neck (Fig 5). After confirmation of proper positioning of the K wire by fluoroscopy, the K wire is replaced by a 1.25-mm guidewire (Synthes, West Chester, PA) via the anteromedial portal. A 2.7-mm cannulated drill bit (Synthes) is inserted along the guidewire together with the 2.7-mm drill sleeve (Synthes), and the bone tract down to the cyst is enlarged. The bone window at the talar neck is further enlarged by an arthroscopic acromionizer (DYONICS; Smith & Nephew) (Fig 6). Caution should be paid to preserve the articular cartilage of the talar dome.

### Endoscopic Debridement of Bone Cyst

The anterolateral portal is the viewing portal and the anteromedial portal is the working portal. The fibrous tissue and membranous lining of the bone cyst are debrided with an arthroscopic shaver (DYONICS; Smith & Nephew), arthroscopic curette (ACUFEX; Smith & Nephew), and arthroscopic punch forceps (ACUFEX; Smith & Nephew) (Fig 7).

### Microfracture of the Cyst Wall

The anterolateral portal is the viewing portal and the anteromedial portal is the working portal. After complete resection of the soft tissue of the bone cyst, microfracture of the cyst wall is performed with an arthroscopic awl (Fig 8).

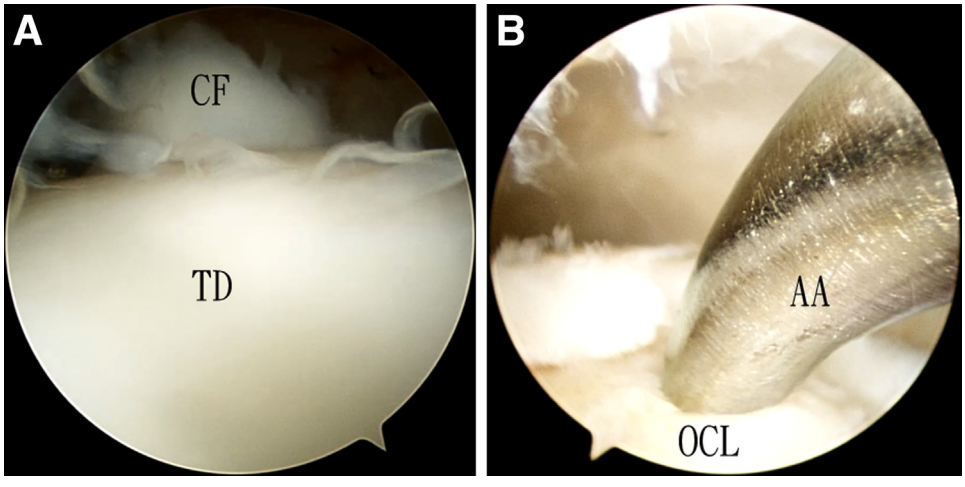


**Fig 4.** Arthroscopic treatment of bone cyst of anterior half of the talar body of the right ankle. The patient is in supine position. The anterolateral portal is the viewing portal and the anteromedial portal is the working portal. (A) The osteochondral lesion is debrided with an arthroscopic probe. (B) Microfracture of the subchondral bone is performed with an arthroscopic awl. (AA, arthroscopic awl; CF, cartilage flap; OCL, osteochondral lesion; TD, talar dome.)

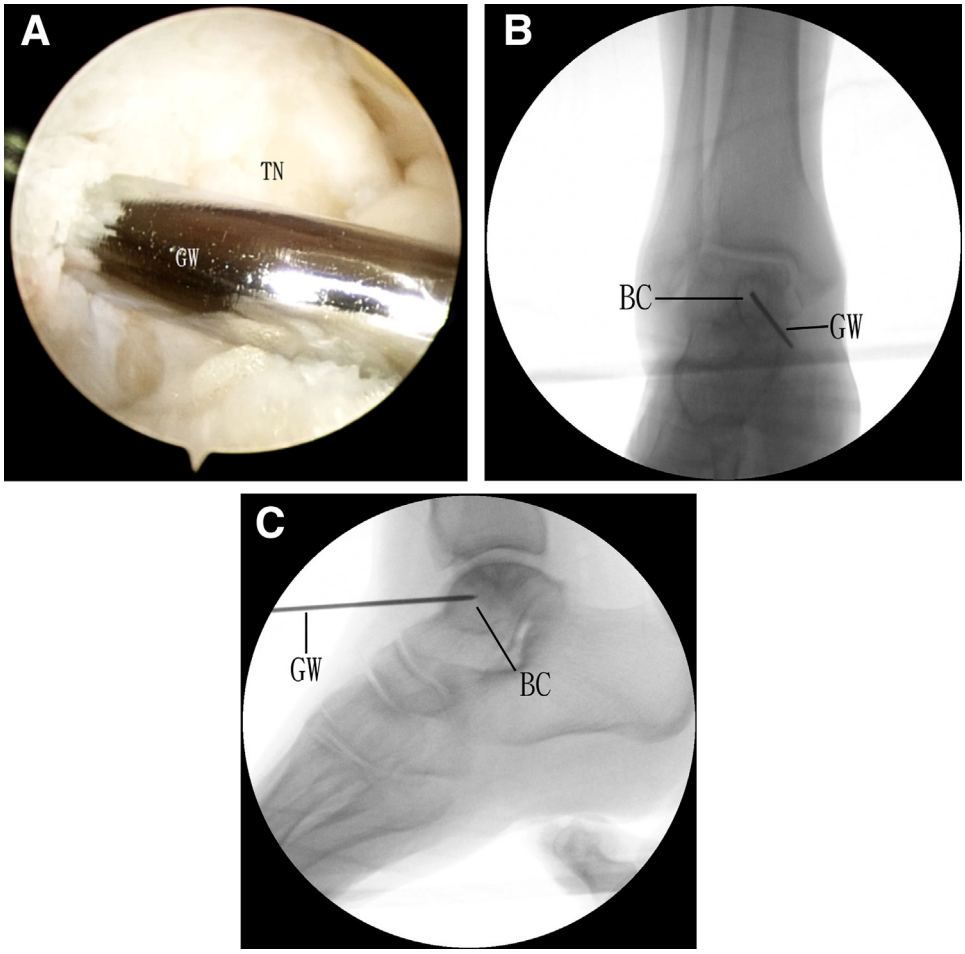


**Fig 5.** Arthroscopic treatment of bone cyst of anterior half of the talar body of the right ankle. The patient is in supine position. The anterolateral portal is the viewing portal and the anteromedial portal is the working portal. A 1.6-mm K wire is inserted into the ankle joint via the anteromedial portal. Under fluoroscopic guidance, the K wire is inserted into the bone cyst through the talar neck. (A) Arthroscopic view; (B) anterolateral fluoroscopic view; (C) lateral fluoroscopic view. (BC, bone cyst; GW, guidewire; TN, talar neck.)

### Injection of Bone Graft Substitute

The procedure is converted into dry arthroscopy and endoscopy. The anterolateral portal is the viewing portal and the anteromedial portal is the working portal. The fluid inflow is switched off and the blood of the cyst is sucked out. The PRO-DENSE injectable regenerative graft (Wright, Memphis, TN) is injected into the cyst. The injectable regenerative graft is packed into the cyst by a periosteal elevator. The excessive graft is removed (Fig 9, Video 1, Table 2). Postoperatively, the

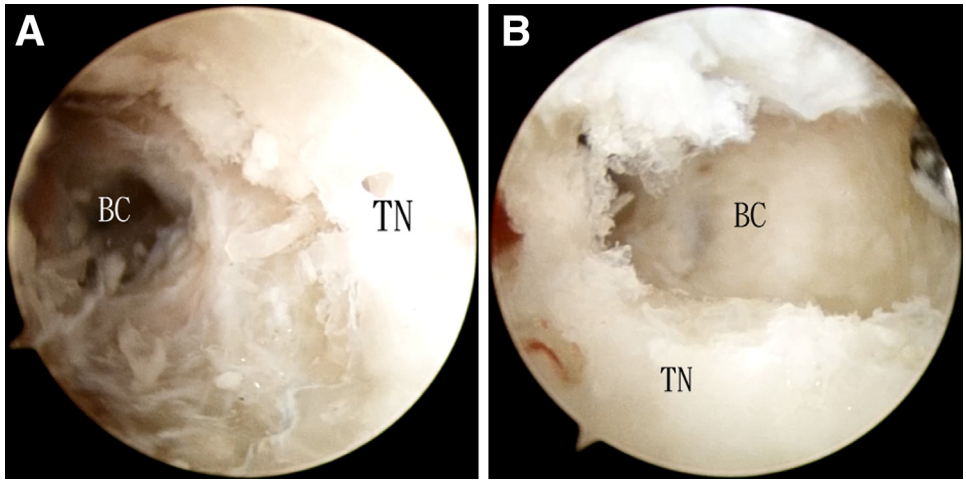


**Fig 6.** Arthroscopic treatment of bone cyst of anterior half of the talar body of the right ankle. The patient is in supine position. (A) The bone tract from the talar neck to the bone cyst. (B) The bone window at the talar neck is further enlarged by an arthroscopic acromionizer. (BC, bone cyst; TN, talar neck.)

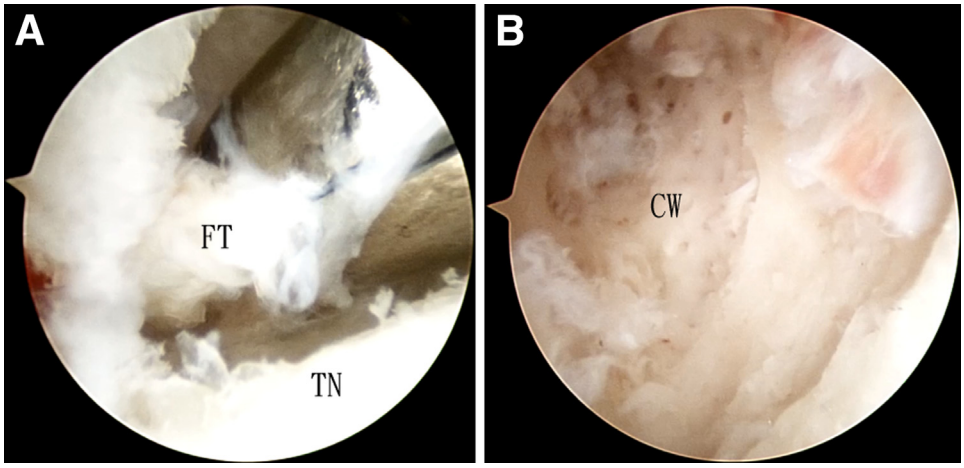


**Fig 7.** Arthroscopic treatment of bone cyst of anterior half of the talar body of the right ankle. The patient is in supine position. The anterolateral portal is the viewing portal and the anteromedial portal is the working portal. (A) The fibrous tissue of the bone cyst is removed by an arthroscopic punch forceps. (B) arthroscopic view of the cyst wall after debridement of the bone cyst. (CW, cyst wall; FT, fibrous tissue; TN, talar neck.)

ankle is immobilized in an ankle–foot orthosis for 2 weeks.

## Discussion

Careful preoperative planning with computed tomography is the key of success for arthroscopic management of the talar bone cysts, as it allows accurate planning of bone portals of the talus to access the bone cyst.[3] As compared with fluoroscopic-guided curettage and bone grafting of the talar cyst, the arthroscopic approach can have better assessment of completeness of debridement and can manage the associated OCL.[3,6]

Injectable regenerative graft instead of autograft is used to eliminate donor morbidity, shorten the operation, and eliminate the risk of dropping of bone graft into the ankle joint.[5] The injectable regenerative graft is based on combinations of the fast-dissolving calcium sulfate and the stronger and more slowly remodeling calcium phosphate compounds. This might enhance vascular infiltration and replacement of the graft by

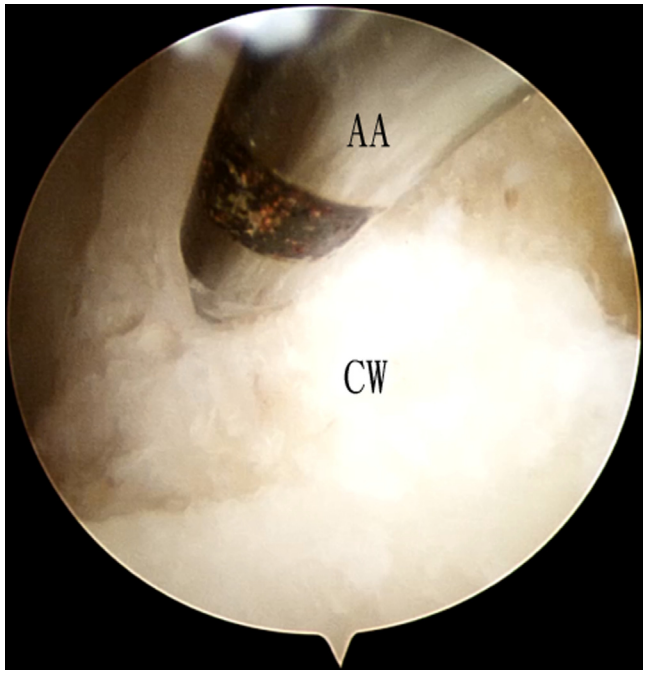


**Fig 8.** Arthroscopic treatment of bone cyst of anterior half of the talar body of the right ankle. The patient is in supine position. The anterolateral portal is the viewing portal and the anteromedial portal is the working portal. After complete resection of the soft tissue of the bone cyst, microfracture of the cyst wall is performed with an arthroscopic awl. (AA, arthroscopic awl; CW, cyst wall.)

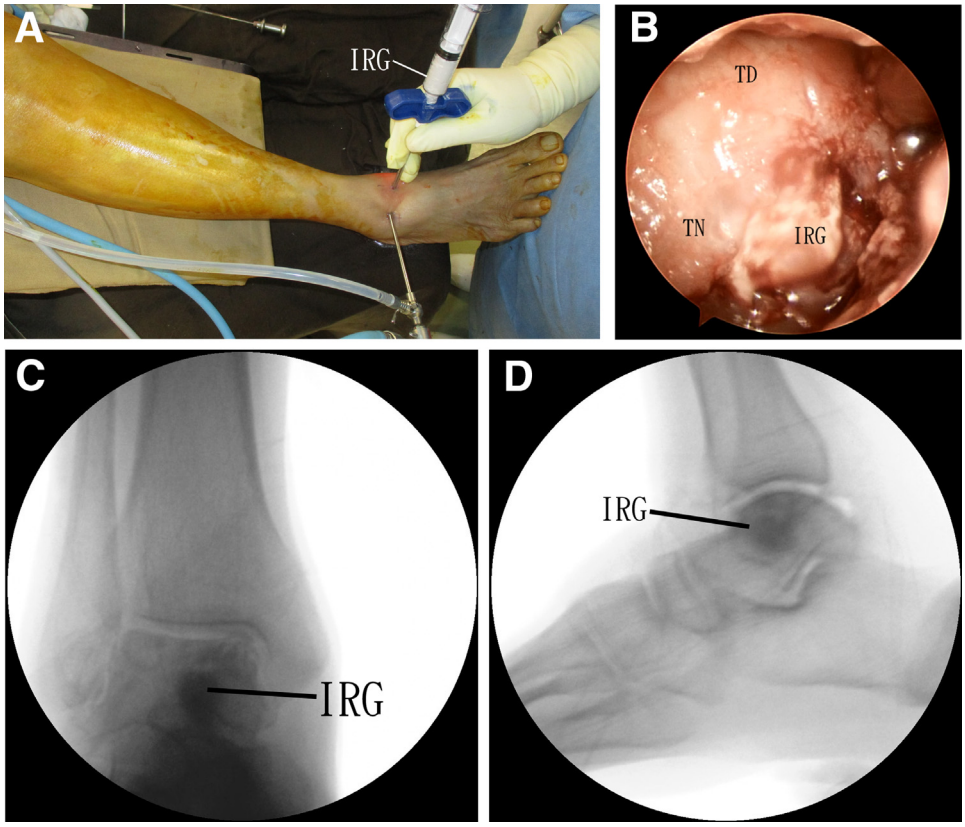


**Fig 9.** Arthroscopic treatment of bone cyst of anterior half of the talar body of the right ankle. The patient is in supine position. It is converted into dry arthroscopy and endoscopy. The anterolateral portal is the viewing portal and the anteromedial portal is the working portal. The fluid inflow is switched off and the blood of the cyst is sucked out. (A) The PRO-DENSE injectable regenerative graft is injected into the cyst. (B) Arthroscopic view shows that the cyst is filled up with the graft. (C) Anteroposterior fluoroscopic view confirms that the cyst is filled up with the graft. (D) Lateral fluoroscopic view confirms that the cyst is filled up with the graft. (IRG, injectable regenerative graft; TD, talar dome; TN, talar neck.)

new bone, whilst providing osteoconductive and mechanical support.[13]

The advantages of this minimally invasive technique include better cosmetic result, minimal soft-tissue dissection, fewer wound complications, clear visualization of the cyst, and preservation of the articular cartilage. The potential risk of this technique includes iatrogenic fracture of the talus, injuries to the superficial peroneal nerve, recurrence of the cyst, and dropping of the graft into the ankle joint (Table 3). This technique is not technically demanding and can be attempted by the averaged foot and ankle arthroscopists.

**Table 2.** Pearls and Pitfalls of Arthroscopic Treatment of Bone Cyst of the Anterior Half of the Talar Body

| Pearls | Pitfalls |
|---|---|
| • Careful preoperative planning with computed tomography is the key to success.<br>• The anteromedial portal is made at the lateral side of tibialis anterior tendon and the anterolateral portal is made at the medial side of the peroneus tertius tendon to improve access to the bone cyst. | • It is not suitable for bone cysts located just underneath a large osteochondral lesion, as the cyst can be approached through the osteochondral lesion.<br>• It is not suitable in cases of significant osteoarthrosis of the ankle.<br>• Using this approach to access the posterior talar bone cyst will result in excessive bone removal. |

**Table 3.** Advantages and Risks of Arthroscopic Treatment of Bone Cyst of the Anterior Half of the Talar Body

| Advantages | Risks |
|---|---|
| • Better cosmetic result<br>• Minimal soft-tissue dissection<br>• Fewer wound complications<br>• Clear visualization of the cyst<br>• Preservation of the articular cartilage | • Iatrogenic fracture of the talus<br>• Injuries to the superficial peroneal nerve<br>• Recurrence of the cyst<br>• Dropping of the graft into the ankle joint |

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