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A Novel Reproducible Single Puncture Medial Pie-Crusting Technique

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Faculty Disclosure Information

- Nothing to disclose

Introduction: Medial Compartment Access

- **Challenge** - Limited space in a tight medial compartment during arthroscopy (Fig 1)
- **Solution** - **Medial pie-crusting technique** to improve access
- **Innovation** - Utilization of a **single puncture technique**
  Puncture site - **specific to the location of the meniscal lesion**
  (posterior horn or body)

- **Objective**
  - ➔ Describe the **anatomy, science and technique** of targeted pie-crusting
  - ➔ Evaluate the **reproducibility** of this focused approach

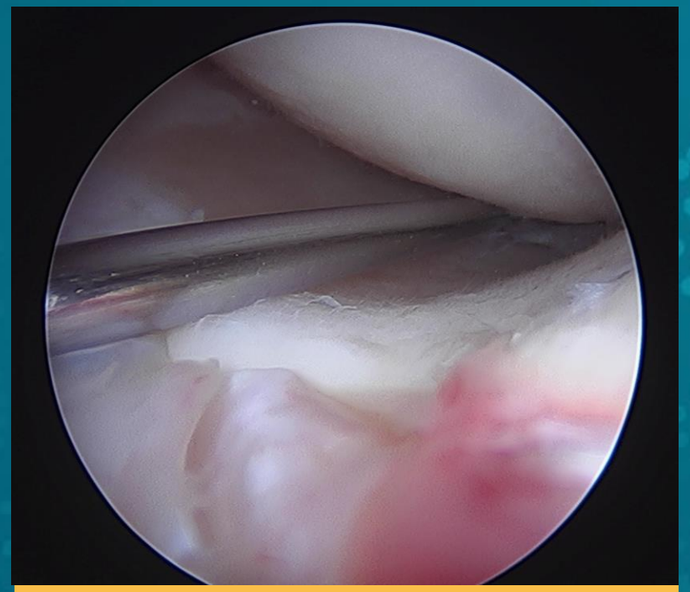


Fig 1: Limited visualization of Medial compartment knee

Cadaveric Validation of Targeted Medial Pie-Crusting

- **Single puncture** technique applied to open medial compartment targeting the **posterior horn of the medial meniscus** on a **fresh frozen cadaver**
- **Arthroscopic visualization** confirmed successful compartment opening
- Needle was left in situ after pie-crusting. **Medial dissection** was performed to **identify the specific structure punctured** during the technique.
- **Dissection Finding:** Puncture at 12mm from the joint line was found to be the most effective point for medial compartment opening. **Puncture was at POL** (Fig 2).

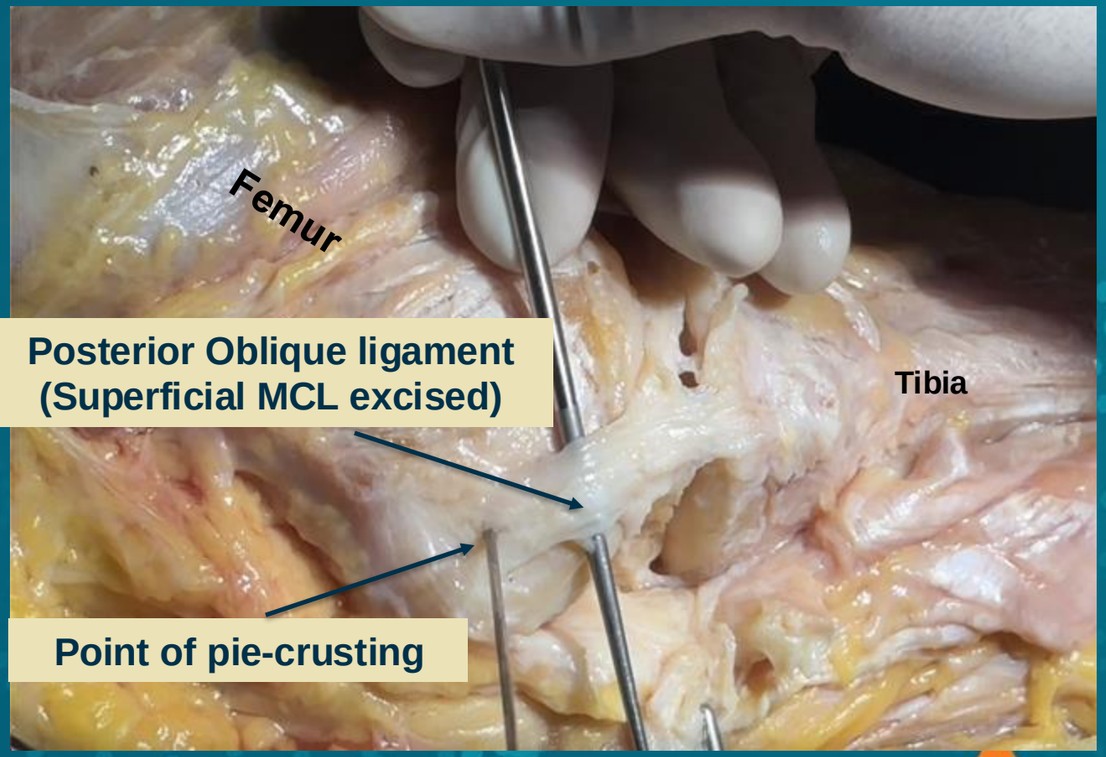


Fig 2: Open cadaver validation of Arthroscopic pie-crusting site

Materials & Methods

1 Portals (Fig 3)

- **Anterolateral portal**: Viewing Portal

- **Anteromedial portal**: Probe is placed in direct line to palpate the posterior horn of medial meniscus.

Fig 3: Anterolateral viewing & Antero- medial working portal

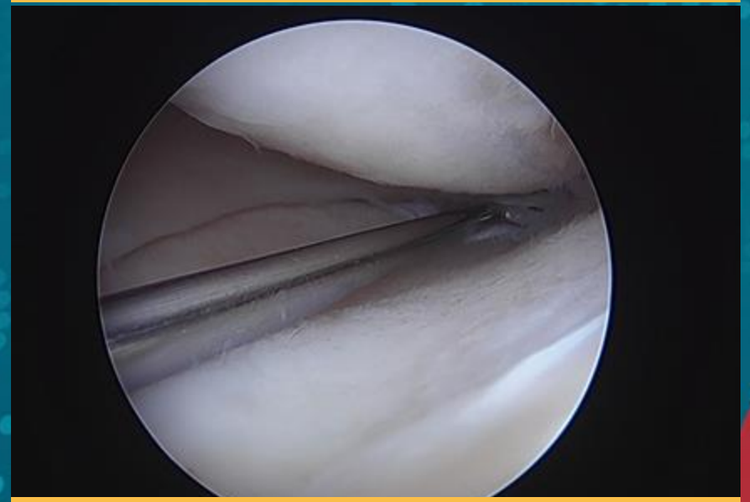


Fig 4: Visualization of tight medial compartment

Materials & Methods

2 Localization of Pie-Crusting Site

- **Probe is pinched at skin level** to mark the depth of the posterior horn (Fig 5)
- Probe is then **withdrawn**
- A **switching stick is placed horizontally** at the level of the anteromedial portal (Fig 6)
- The **probe** is placed **externally** on the medial aspect of the knee, **perpendicular** to the switching stick, matching the previously measured depth (Fig 7)

Fig 5: Pinching probe at the portal

Fig 6: Switching stick placed horizontally at the same level

Fig 7: The probe length corresponds to the measured intra-articular depth and is placed on the medial aspect of knee

Materials & Methods

3 Targeted Pie-Crusting Technique

- **18G needle puncture** is performed **12 mm proximal to the marked point** (Fig 8)
- Results in a **visibly increased medial compartment space** under arthroscopic view (Fig 9)

*For **body of medial meniscus**:*

- *Probe is aligned in a **direct line** from the anteromedial portal to the **body level***
- ***Pie-crusting** is **performed** using the same depth-based localization*

Fig 8: 18 G needle used for pie-crusting

Fig 9: Good visualisation of medial compartment after pie-crusting

Material & Methods | Study Design

Multicentre study at 3 centres by 3 different surgeons.

30 consecutive knee arthroscopy cases done between September 1st 2023 to March 31st 2024 requiring medial compartment opening were taken into the study.

Procedure was performed using the **described technique**

Materials & Methods | Definition

Opening in First Attempt

- Successful access to the lesion site in the medial compartment with a **single skin puncture**.
- Minor needle angulation is permitted **without removing** it from the initial puncture site.

Missed in First Attempt

- Defined as the need to **withdraw the needle** and create a **new skin puncture**.

Failure of Attempt

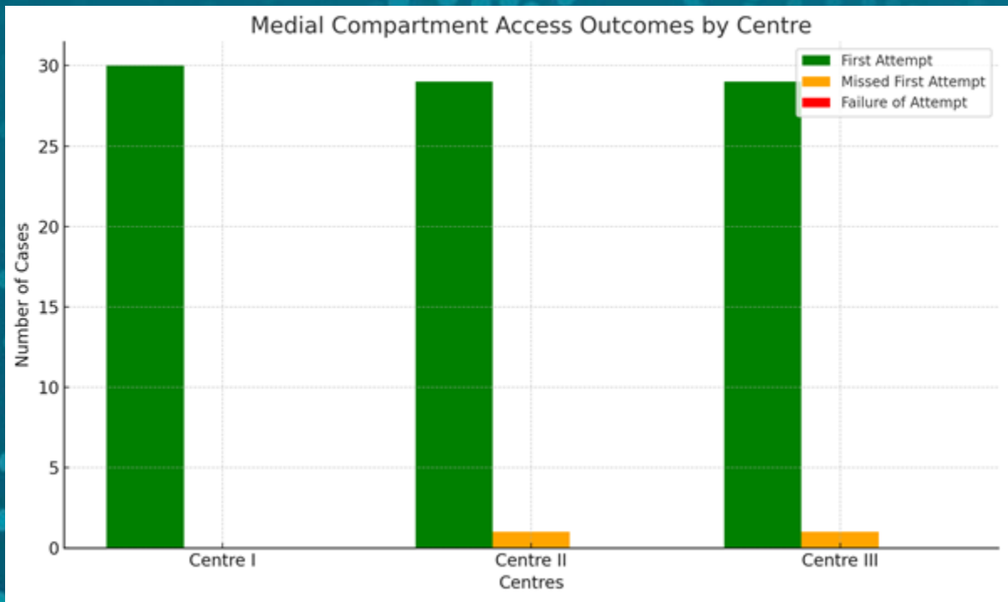
- When the surgeon **could not access** the medial compartment using the described technique and had to **switch to an alternative method**.

Results

- **Centre I:**
  - Opening in first attempt: **30/30 cases**
- **Centre II:**
  - Opening in first attempt: **29 cases**
  - Missed in first attempt: **1 case** (successful on second attempt)
- **Centre III:**
  - Opening in first attempt: **29 cases**
  - Missed in first attempt: **1 case** (successful on second attempt)

Results (Total: 90 cases)

- ✅ Opening in first attempt: 88 cases (97.78%)
- 🔁 Missed in first attempt: 2 cases (2.22%)
- ❌ Failure of attempt: 0 cases (0%)



Conclusion

- This cadaveric anatomy-based technique has been effectively adopted for clinical use.
- It allows targeted and reliable access to medial meniscus lesions.
- The approach is straightforward, consistent and easily reproducible in routine surgical settings.

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Thank you

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