Distal tibial allograft (DTA) in the management of recurrent anterior shoulder instability - a systematic review of biomechanical, radiological and clinical outcomes.

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Faculty Disclosure Information

- **Peter D'Alessandro –**
  - Speaker for Medacta, Smith & Nephew, Arthrex.
  - Paid Consultant for Smith & Nephew;
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  - Board of Directors member for Australian Orthopaedic Association
- **Jarret M. Woodmass**
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Introduction

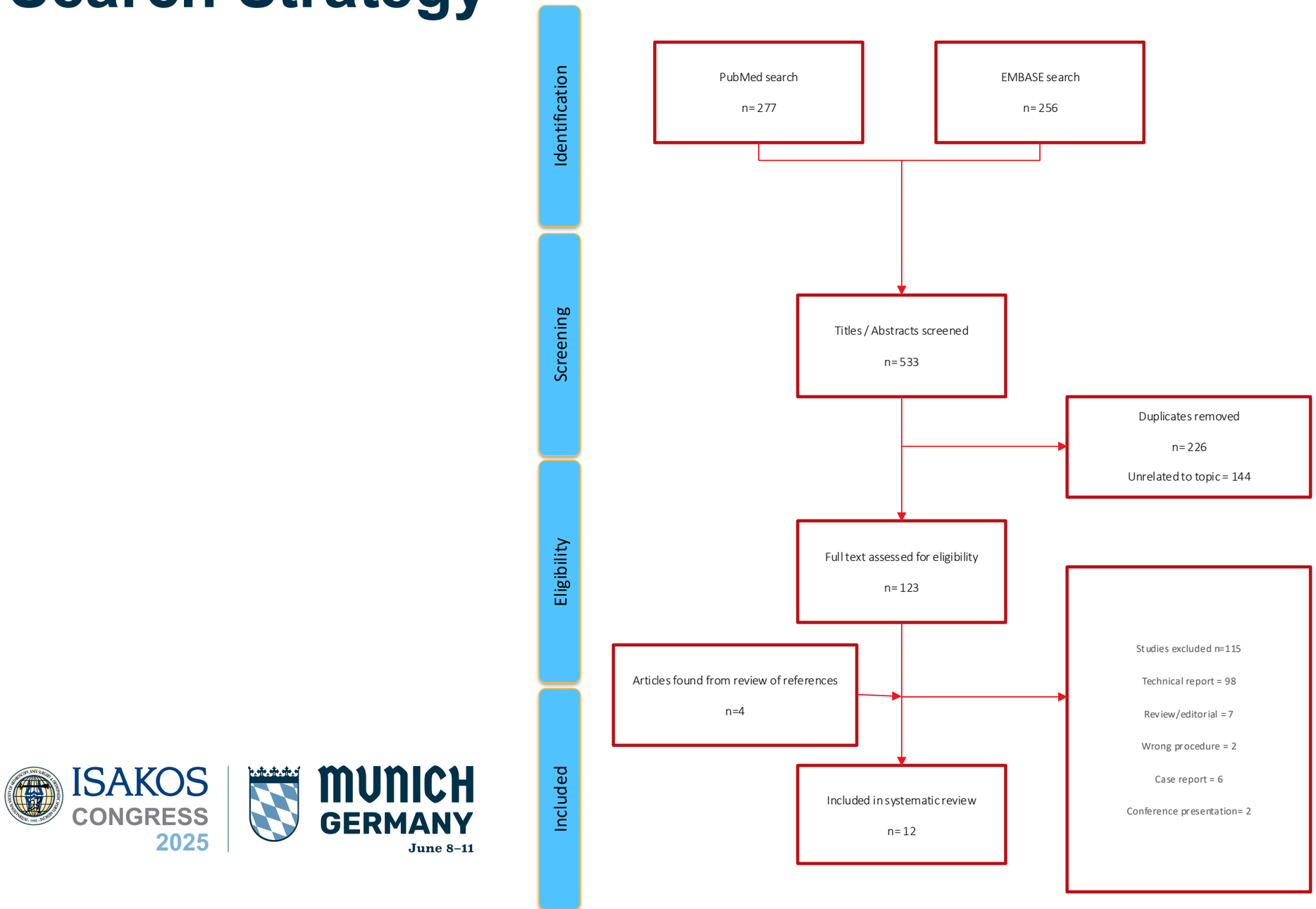
- ASI with glenoid bone loss can utilise
  - autograft options, including Latarjet, iliac crest or distal clavicle, or
  - allografts, such as lunate fossa of distal radius, radial head or distal tibia.

- The aim of this review was to assess the clinical, radiological and biomechanical outcomes of distal tibial osteochondral allograft for reconstruction of glenoid with bone loss.

Methods

- **Registration & Guidelines:**
  - Prospectively registered on **PROSPERO** (Ref: 528243)
  - Conducted in accordance with **PRISMA** guidelines
- **Literature Search:**
  - Databases: **MEDLINE, Embase, PubMed**
  - Search performed in December 2023 and repeated in February 2024
- **Inclusion Criteria:**
  - Studies reporting **radiological, biomechanical, functional,** or **clinical outcomes**
  - Focused on **distal tibial osteochondral allograft** use
- **Quality Appraisal:**
  - Methodological quality assessed using the **MINORS** tool

Search Strategy



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Results

- **Total Included Studies:**
  – **12 studies** met inclusion criteria
    ▫ **8 clinical studies** (n = 345 patients)
    ▫ **4 biomechanical studies** (n = 68 specimens)

- **Patient Demographics (Clinical Studies):**
  – **Mean age:** 32.8 years (range: 18–88)
  – **Mean follow-up duration:** 26 months (range: 16–47)

Results

Radius of Curvature (ROC) Comparisons:
- **DTA:** 24.5 ± 1.9 mm (range: 17.5–27.5)
- **Glenoid:** 26.1 ± 2.8 mm (range: 22.5–30)
- DTA closely matches glenoid ROC

• **ROC of Other Grafts:**
- Coracoid: 24.0 ± 2.1 mm (20–27.5)
- Distal radius: 20.7 ± 2.1 mm (20–27.5)
- Iliac crest autograft: >35 mm ($p < 0.05$)

- **Contact Mechanics (DTA vs Others):**

- **Intact glenoid:**
  - Contact area 4.87 cm^2,
  - Contact pressure 2.63 kg/cm^2
- **DTA:**
  - Contact area: 4.20 cm^2
  - Contact pressure: 2.70 kg/cm^2
- **Latarjet procedure:**
  - Contact area 3.52 cm^2,
  - Contact pressure 2.83 kg/cm^2

DTA restored contact area/pressure more closely to intact glenoid.

Results: Clinical outcomes

- **Subluxation reported in 3.5%** (16 patients); **dislocations in 0.4%** (2 patients)
- **All four studies** reporting functional outcomes showed **statistically significant improvement** post-op
- **Mean union rate**: 97.5% (range: 91–100%)
- **Resorption rates** varied widely: **6% to 83%**
- **Anteroposterior glenoid width** improved to a **mean of 32.26mm**

Results: Radiological Outcomes

- **Union Rate:**
  - 4 studies: 100% union on CT
    - Others: DTA = 91–94%;
    - Coracoid = 75% (NS, p=0.08)

- **Resorption Rate:**
  - 0% in 2 studies
  - Variable in others; up to 77% in one study
  - **Zone 3 resorption** significantly higher in DTA ($p < 0.05$)

Complications

- **Overall complication rate**: 4.4% (range: 0–7.5%)
  - **Most common complications**:
    - Hardware-related (1.3%)
    - Nerve injury (1.04%)

- **Revision rate** = 2.3%
  - majority due to **hardware failure (1.3%)**

- **Seven comparative studies** evaluated DTA vs alternative grafts (allograft or coracoid autograft)
  - **No significant differences** in recurrence or functional outcomes between DTA and other grafts

Conclusion

- Patients undergoing bone block with DTA for ASI have
  - significantly better post-operative functional scores,
  - high union rate with low complication and revision rates.

- DTA also has a good radius of curvature with better contact pressure and contact area making it an ideal allograft choice for glenoid.

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