The value of intra-operative fluoroscopy in total trapeziometacarpal joint arthroplasty.

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Background
Correct implant position is essential to obtain good results in ball-in-socket trapeziometacarpal total joint arthroplasty. Adequate placement of the cup in the trapezium can be challenging, but is an important factor to prevent postoperative complications.

Purpose
The objective of this study was to determine if intra-operative fluoroscopic control improves the position of the cup in the trapezium.

Study design
A double-center, retrospective case-control study evaluating 114 cases of total joint arthroplasty for trapeziometacarpal osteoarthritis. We evaluated cup centring and cup inclination on postoperative radiographs. Approval of the local ethical board was obtained.

Methods
• We retrospectively evaluated 114 cases of total joint arthroplasty for trapeziometacarpal osteoarthritis in 2 centers.
  - Patients were divided in 2 groups:
    - Group 1: 57 cases (53 patients) where the cup was implanted with fluoroscopic control to place the cup centrally in the trapezium and parallel with the proximal articular surface of the trapezium (PAST).
    - Group 2: 57 cases (48 patients) where the cup was placed in the trapezium without fluoroscopic control. Position of the cup was determined by visual inspection only.
  - Technique:
    In group 1, surgeries were performed by author JD and a Maïa prosthesis (Groupe Lépine) was implanted through a palmar (Moberg-Gedda) approach.
    In group 2, surgeries were performed by author AD and an Arpe prosthesis (Zimmer-Biomet) was implanted through a lateral approach.
  - Patient characteristics:
    - Group 1 consisted of 40 women and 13 men. The mean age was 65 years [range 45-75] at the time of surgery.
    - Group 2 consisted of 44 women and 4 men. The mean age was 57 years [range 48-82] at the time of surgery.
  - Radiological evaluation:
    Postoperative radiological evaluation included a posteroanterior and lateral view of the trapeziometacarpal joint following the technique of Kapandji.
    Central placement of the cup was determined by measuring the width of the trapezial bone at its distal surface on both sides of the cup (Fig 1). The fraction formed by both distances represents the degree of cup centring and was called the centralization index. A perfectly centered cup would have a centralization index of 1.
    Inclination of the cup was measured as the angle between the distal, flat surface of the cup and the PAST (Fig 2). An inclination angle of 0° was considered optimal. All measurements were performed by 2 examiners.

Results

Discussion and Conclusion
• The intra-operative use of fluoroscopy improves cup placement in the trapezium
  - improved mean cup inclination.
  - less between patient variability (less outliers) for both cup centring and cup inclination.
• It can be assumed that eccentric placed or tilted cups have a higher chance of postoperative complications such as loosening or dislocation, but until now there is no clinical or biomechanical evidence to support this. Future research should evaluate the effect of component position on complication rate and implant survival.

References