

Cortical contact is not necessary to prevent stem subsidence in  
cementless trapeziometacarpal arthroplasty: A follow-up study

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1 Cortical contact is unnecessary to prevent stem subsidence in cementless  
2 trapeziometacarpal arthroplasty: follow-up study.

3 *Le contact cortical n'est pas nécessaire pour prévenir l'affaissement de la tige dans*  
4 *l'arthroplastie trapézométacarpienne sans ciment : l'étude de suivi.*

5

6 Dear Sir,

7

8 We previously reported that impacted cancellous bone can provide adequate stability  
9 for uncemented stems in the thumb metacarpal [1]. We based our conclusion on the  
10 fact that we did not observe radiographic subsidence at one year postoperatively in a  
11 series of 87 Maïa prostheses. In 77% of the cases the stem was implanted without  
12 cortical bone contact on posteroanterior (PA) and lateral radiographic views. We  
13 reassessed the same patient group after a mean follow-up period of 6,1 years (range  
14 2 – 10). 57 patients (75%) could be recruited, representing 66 implants (76%). Three  
15 patients had deceased and two implants were removed because of trapezium fracture  
16 and infection. Similar to the previous study, stem position was expressed as the ratio  
17 between the length of the metacarpal and the distance between the proximal end of  
18 the stem and the distal articular surface of the thumb metacarpal. Subsidence was  
19 determined by comparing stem position immediately after surgery and at last follow-  
20 up. Linear mixed models were used to obtain the mean and 95% confidence intervals  
21 for (1) stem position immediately after surgery, (2) stem position at final follow up, and  
22 (3) the change in stem position over time. On posteroanterior radiographs, the mean  
23 ratio immediately postoperatively was 1,414 (95% CI 1,390; 1,438) and at follow-up  
24 1,420 (95% CI 1,390; 1,450). On average, this number decreased by 0,007 (95% CI -  
25 0,009; 0,024) at follow-up. This was not statistically significant ( $P = 0,3871$ ). On lateral

26 radiographs, the ratio immediately postoperatively was 1,397 (95% CI 1,374; 1,420)  
27 and at follow-up 1,406 (95% CI 1,383; 1,428). The mean difference between both time  
28 points was 0,008 (95% CI -0,0003; 0,016) and not significant (P = 0,060).

29 The present study confirms that impacted cancellous bone can provide adequate  
30 primary stability to allow secondary bone ongrowth. However, other radiographic  
31 findings were observed. Minor heterotopic ossifications were present in most cases.  
32 One patient had a unilateral radiolucent line at the stem-bone interface with no other  
33 signs of loosening. Similar findings were described in another series with more than 6  
34 years follow-up [2], also without evidence of metacarpal loosening or sinking of the  
35 stem.

36 In 16% of our cases there was cortical stem contact on both PA and lateral views at  
37 level of the isthmus. We did not observe stress-shielding as predicted by Ledoux in a  
38 finite element analysis study [3]. In two implants without cortical bone contact, there  
39 was endosteal bone formation between the tip of the stem and the inner cortex of the  
40 metacarpal (Fig. 1). This represents prosthesis-to-bone stress transfer away from the  
41 metaphyseal part of the implant and has not been described yet in trapeziometacarpal  
42 total joint replacement. The clinical significance of these bone reactions remains  
43 unclear and warrant longer-term follow-up.

44

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#### 50 References

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61 Figure legends

62 Figure 1. Radiographic evaluation ten years after Maia trapeziometacarpal total joint  
63 arthroplasty. Slight oblique positioning of the stem. No signs of loosening. Unilateral  
64 endosteal bone formation between the tip of the stem and the inner cortex of the  
65 metacarpal (°). Minor heterotopic ossification and stem overgrowth at the metacarpal  
66 base (\*).