

Risk factor for discontinuity at the pubic osteotomy site three years after periacetabular osteotomy

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INTRODUCTION: Discontinuity at osteotomy sites is a complication after periacetabular osteotomy (PAO). The objectives of this study were to clarify risk factors associated with discontinuity more than one year after PAO surgery, and to assess whether the discontinuity was due to delayed union or non-union.

METHODS: We performed retrospective review of 104 hips in 95 consecutive patients who underwent PAO between 2017 and 2021, and evaluated pre- and post-PAO radiographs of 97 hips in 89 patients. Radiographic evaluations included the occurrence of stress fractures in the inferior pubic ramus and posterior column, the incidence of discontinuity at osteotomy sites and in stress-fractured bones, centre-edge angle, acetabular roof obliquity and Tönnis grade. Clinical evaluations included age at surgery, body mass index and Harris hip score.

RESULTS SECTION: The incidence of discontinuity at the pubic osteotomy site and stress-fractured posterior column improved from 16.5% and 1% at one year post-operatively to 5.2% and 0% at the final follow-up, respectively (Table 1). Multivariate analysis showed that post-operative stress fracture of the inferior pubic ramus was significantly more common in patients with discontinuity at stress-fractured inferior pubic rami at final follow-up (Table 2).

DISCUSSION: Our study is the first retrospective case–controlled study to report risk factors for discontinuity at the pubic osteotomy site more than one year post-PAO surgery. We found that post-operative stress fracture of the inferior pubic ramus is a risk factor for discontinuity at the pubic osteotomy site at a mean of 3.2 years after PAO. We also demonstrated that patients with discontinuity at osteotomy sites and/or in stress-fractured inferior pubic rami and posterior columns at one year post-PAO may have subsequent continuity. These data suggest that discontinuity at one year post-operatively should be defined as delayed union, not non-union.

SIGNIFICANCE/CLINICAL RELEVANCE: If patients with discontinuity at these sites have tolerable pain and no stress fracture of the inferior pubic ramus, additional surgery can wait until approximately two years after PAO.

Table 1. Incidence of discontinuity at osteotomy sites and stress-fractured inferior pubic ramus and posterior column

Parameter	One year post-surgery n = 97	Final follow-up n = 97
Discontinuity of the pubic osteotomy site (no. of hips, %)	16 (16.5%)	5 (5.2%)
Discontinuity of the ischial osteotomy site (no. of hips, %)	0	0
Discontinuity of the iliac osteotomy site (no. of hips, %)	0	0
Discontinuity of the ASIS-osteotomy site (no. of hips, %)	0	0
Discontinuity of stress-fractured inferior pubic ramus (no. of hips, %)	3 (3.1%)	0
Discontinuity of stress-fractured posterior column (no. of hips, %)	2 (2.1%)	0

ASIS: anterosuperior iliac spine; No.: number

Table 2. Comparison of patients with discontinuity or with continuity at the pubic osteotomy site at the final follow-up

	Discontinuity group n = 5	Continuity group n = 92	Univariate p-value	Multivariate p-value
Sex, male:female (no. of hips)	0:5	3:89	0.682	
Age at the surgery (years)	49.0 ± 5.1 (42–55)	35.9 ± 13.6 (13–56)	0.0374*	0.385
Body mass index (kg/m ²)	25.8 ± 5.5 (19.9–33.8)	22.8 ± 3.5 (16.1–34.6)	0.195	
Post-operative follow-up duration (years)	3.2 ± 0.8 (2.0–4.0)	3.0 ± 1.2 (1.0–5.2)	0.591	
Lateral centre-edge angle (°)				
Pre-operative	8.9 ± 2.3 (5.6–10.9)	14.1 ± 6.4 (-7.0–25.6)	0.0398*	0.965
One year post-operatively	37.0 ± 4.8 (31.3–44.8)	39.2 ± 6.0 (27.0–56.4)	0.361	
Correction	28.0 ± 4.8 (20.8–33.2)	25.1 ± 6.1 (13.8–42.5)	0.181	
Acetabular roof obliquity (°)				
Distance at the pubic osteotomy site	3.2 ± 2.5 (0–6.4)	1.5 ± 2.2 (0–9.9)	0.0729	
Pre-operative	22.7 ± 2.6 (19.7–26.6)	17.5 ± 6.2 (5.5–35.8)	0.0306*	0.146

One year post-operatively	-0.4 ± 7.2 (-8.0–8.0)	-2.4 ± 5.7 (-18.6–12.3)	0.59
Correction	23.1 ± 5.0 (18.5–29.2)	19.9 ± 5.5 (5.5–37.6)	0.234
Tönnis grade 0: 1: 2: 3 (no. of hips)	1: 4: 0: 0	46: 44: 2: 0	0.371
Discontinuity of the ischial osteotomy site (no. of hips)	0	2	0.739
Stress fracture of inferior pubic rami (no. of hips)	3	4	2.82 × 10 ⁻⁶ 6*
Discontinuity at one year post-operatively (no. of hips)	2	1	9.84 × 10 ⁻⁷ * 0.331
Stress fracture of the posterior column (no. of hips)	2	0	0.739
Discontinuity at one year post-operatively (no. of hips)	2	0	0.739
Harris hip score (points)			
Pre-operative			
Total	72.6 ± 4.7 (68–79)	75.5 ± 12.2 (33–96)	0.232
Pain	24.0 ± 5.5 (20–30)	24.7 ± 7.2 (10–40)	0.161
Function	39.8 ± 5.0 (33–47)	42.0 ± 7.2 (13–47)	0.139
Absence of deformity	4.0 ± 0 (4–4)	4.0 ± 0 (4–4)	
Range of motion	4.8 ± 0.4 (4–5)	4.9 ± 0.4 (3–5)	0.436
Final follow-up			
Total	98.2 ± 2.0 (96–100)	97.9 ± 3.8 (72–100)	0.668
Pain	42.4 ± 2.2 (40–44)	42.6 ± 2.3 (30–44)	0.757
Function	45.0 ± 3.5 (39–47)	46.4 ± 2.6 (25–47)	0.476
Absence of deformity	4.0 ± 0 (4–4)	4.0 ± 0 (4–4)	
Range of motion	4.8 ± 0.4 (4–5)	4.9 ± 0.3 (3–5)	0.275

Data are presented as mean ± standard deviation (range), *; p < 0.05 indicates significant difference.