Predictive factors for developing osteochondritis dissecans after surgery in discoid lateral meniscus are younger age and shorter meniscal width

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INTRODUCTION: This study aimed to identify the predictive factors for postoperative osteochondritis dissecans (OCD) in juvenile and adolescent knees with discoid lateral meniscus (DLM).

METHODS:

This study was conducted using a protocol that was approved by the institutional review board of our university (IRB number: 2017–0247). In total, 242 patients with symptomatic DLM who underwent surgery were identified. Inclusion criteria were set as follows: 1) age ≤17 years with an open growth plate, 2) follow–up magnetic resonance imaging, and 3) absence of preoperative OCD. Consequently, 52 patients were retrospectively investigated. Average age during surgery, body mass index (BMI), and follow–up duration were 12 years (95 % confidence interval [CI], 11–13), 19.2 kg/m^2 (95 % CI, 18.4–20.1), and 27.3 months (95 % CI, 20.9–33.7), respectively. The surgical procedures were performed arthroscopically: 28 arthroscopic meniscal saucerizations with meniscal repair of peripheral detachments (saucerization with stabilization: group I), 16 arthroscopic meniscal saucerizations alone (saucerization alone: group II), and 8 arthroscopic subtotal meniscectomies (subtotal meniscectomy: group III) (Table 1). Postoperative rehabilitation was performed after each procedure as per each doctor's recommendation. In group I, the following conditions were met: immobilization with a brace for 1–4 weeks; limited range of motion exercises of 0°–90° for 4 weeks and 0°–120° for 6 weeks; and PWB following NWB.

Age, sex, sports activities, BMI, symptomatic OCD in other joints, postoperative rehabilitation, preoperative shift of DLM by Ahn's classification, surgical procedures (saucerization alone or with stabilization, and subtotal meniscectomy), and postoperative meniscal width were analyzed as possible predictive factors. The study groups were categorized postoperatively as non–OCD or OCD. For univariate analysis, comparisons were performed between groups. For the clinically relevant variables with univariate significant differences between groups, adjusted odds ratios (ORs) and 95 % CIs for each risk factor were calculated using logistic regression analyses. In addition, multivariate analysis was performed by applying logistic regression analysis. Finally, receiver operating characteristic (ROC) curve analysis was used to determine the threshold values to predict postoperative OCD.

RESULTS:

For the univariate analysis, logistic regression analysis with the dependent variable of postoperative OCD (Table 2) revealed the following ORs for the following clinically relevant factors: age during surgery (OR = 1.5, p = 0.003), subtotal meniscectomy (OR = 6.3, p = 0.027), meniscal width in the anterior portion (actual width: OR = 1.2, p = 0.014; standardized width: OR = 1.5, p = 0.023), meniscal width in the middle portion (actual width: OR = 2.2, p = 0.001; standardized width: OR = 2.7, p = 0.008), and minimum width (actual width: OR = 1.6, p = 0.001; standardized width: OR = 2.7, p = 0.005). For the multivariate analysis, logistic regression analysis with the dependent variable of postoperative OCD showed the following ORs of factors: age during surgery (OR = 1.6, p = 0.009) and minimum width (standardized width: OR = 1.5, p = 0.003). Younger age showed a higher sensitivity: 8 years of age showed a 90.5 % sensitivity with an OR of 11.1 (p = 0.003). In the reshaping groups (groups I and II), actual and standardized minimum widths of >7.0 mm and 8.0 %, respectively, did not produce OCD lesions.

DISCUSSION AND CONCLUSION:

The most important finding of this study was that the predictive factors for postoperative OCD are a younger age during surgery and a shorter meniscal width. Therefore, to prevent postoperative OCD in DLM surgeries, achieving stabilization with adequate meniscal width is necessary in juvenile knees.

Table 1

Variables	Group I (n=28)		Group II (n=16)		Group III (n=8)		
	median	range	median	range	median	range	p value
Meniscal width in an anterior portion, mm	10.9	6.2–16.1	9.2	2.0–12.8	0.0	0.0–10.7	< 0.0001*
Standardized meniscal width in an anterior portion, %	15.3	9.3–26.1	12.5	3.2–17.7	0.0	0.0–13.3	< 0.0001*
Meniscal width in a middle portion, mm	6.8	2.1–13.6	6.8	1.8–9.5	0.0	0.0–9.2	0.019*
Standardized meniscal width in a middle portion, %	9.4	3.3–22.8	9.5	2.5–14.6	0.0	0.0–12.7	0.018*
Meniscal width in a posterior portion, mm	9.3	5.2–12.7	8.6	6.5–12.9	8.8	0.0–11.5	n.s.
Standardized meniscal width in a posterior portion, %	12.8	8.2–19.0	12.5	9.0–17.0	12.0	0.0–15.5	n.s.
Minimum meniscal width of all portions, mm	6.7	2.1–11.1	6.5	1.8–8.8	0.0	0.0–0.0	< 0.0001*
Standardized minimum meniscal width of all portions, %	9.3	3.3–15.4	9.2	2.5–14.0	0.0	0.0–0.0	< 0.0001*
Duration of NWB, week	3	0–5	0	0–2	0	0–3	< 0.0001*
Beginning time in FWB , week	6	0–8	0	0–4	1	0–6	< 0.0001*
Beginning type of WB after surgeries (NWB : PWB : FWB), n	27 : 0 : 1		6 : 1 : 9		3 : 1 : 4		< 0.0001*
Preoperative Ahn's classification (N : C : PC : AC), n	8 : 4 : 13 : 3		8 : 3 : 5 : 0		2 : 2 : 3 :1		n.s.
Preoperative Ahn's classification (N : shift type), n	8 : 20		8 : 8		2 : 6		n.s.

Table 2

Variables	Odds ratio	95%CI	p value
Age, years	1.5	1.2–2.0	0.003*
Subtotal meniscectomy	6.3	1.2–32.4	0.027*
Meniscal width in an anterior portion, mm	1.2	1.0–1.5	0.014*
Standardized meniscal width in an anterior portion, %	1.5	1.1–2.1	0.023*
Meniscal width in a middle portion, mm	2.2	1.4–3.4	0.001*
Standardized meniscal width in a middle portion, %	2.7	1.3–5.7	0.008*
Meniscal width in a posterior portion, mm	1.7	1.0–2.7	0.032*
Standardized meniscal width in a posterior portion, %	1.6	0.9–2.5	n.s.
Minimum width of all portions, mm	1.6	1.2–2.2	0.001*
Standardized minimum width of all portions, %	2.7	1.3–5.3	0.005*