Influence of preoperative bone marrow lesions on postoperative cartilage improvement after open wedge high tibial osteotomy

Kawamura K, Sasaki E, Tsushima T

Kimura Y, Sakamoto Y, Tsuda E, Ishibashi Y

Dept. of Orthopaedic Surgery and Rehabilitation Medicine
Hirosaki University Graduate School of Medicine, Hirosaki, Japan

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COI disclosure of the first presenter
First presenter：Kawamura K

There are no companies or other entities with which there are COI relationships to be disclosed in relation to the presentation.

Postoperative cartilage improvement after High Tibial Osteotomy (HTO) and Bone marrow lesion (BML)

■Good postoperative PROM with cartilage improvement after HTO

Tsushima T, et al. KSSTA 2024

■Pre- and postoperative BML associated with pain and function

Kim MS, et al. Am J Sports Med. 2019
Zhu B, et, al. Biomed Res Int. 2021

Clinical question: Relationship between BML and postoperative cartilage improvement is unknown.

Purpose

To examine the association between preoperative BML and postoperative cartilage improvement after HTO

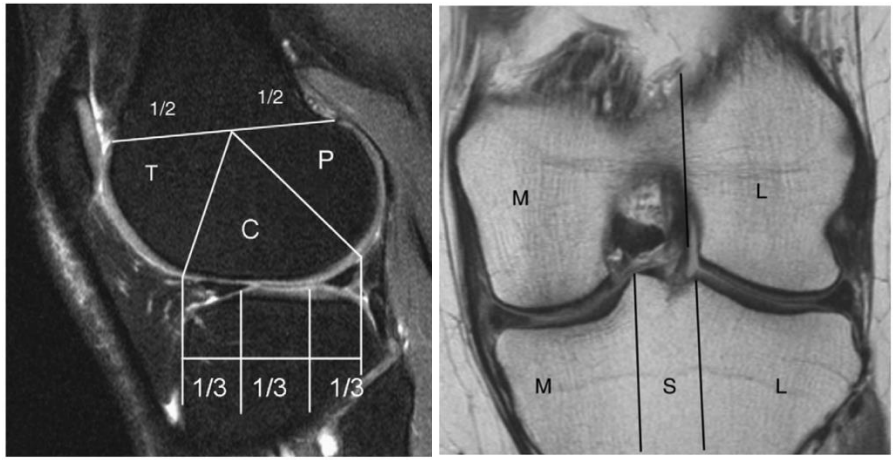
Methods

Subjects

- 110 knees of 96 patients who underwent HTO
- All patients underwent implant removal and 2nd-look AS at 1 year after HTO

Preop. BML assessment

- MOAKS (MRI Osteoarthritis knee sore)
- MFC and MTP



Cartilage assessment

ICRS grade at HTO and second look AS

Classification of cartilage improvement (CI)

CI group: Improved at least one level of ICRS grade

Non-CI group: not improved

Survey items

■Background

Age

Sex

Height

Weight

BMI

■Surgical factors

Opening width

Follow-up period

■X-ray measurement

(pre-, post-op. 1Y)

WBLR: Weight bearing line ratio

MPTA: Medial proximal tibia angle

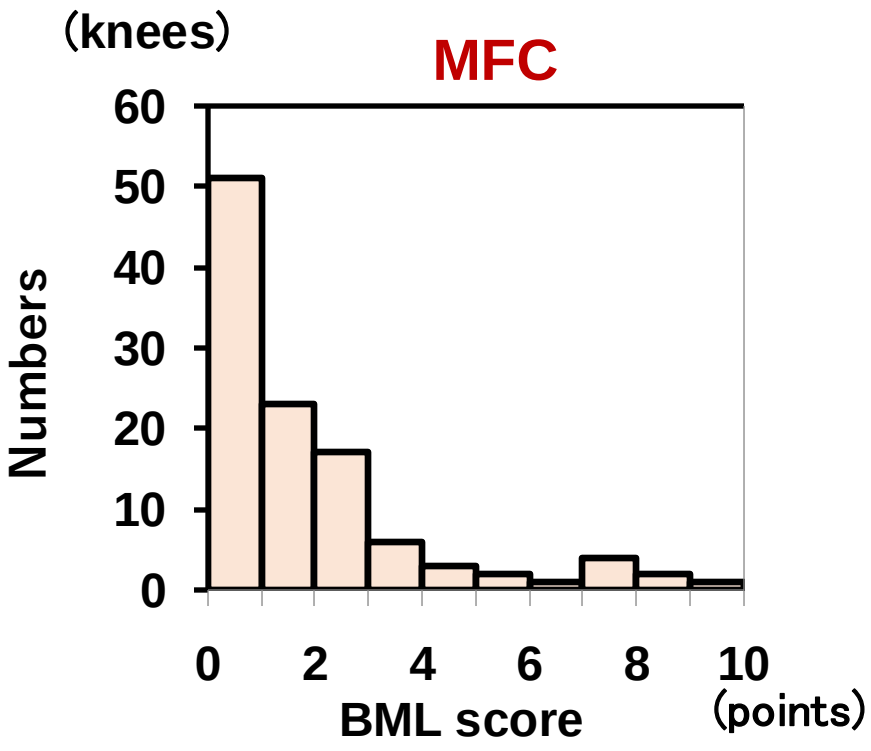
PTS: Posterior tibia slope

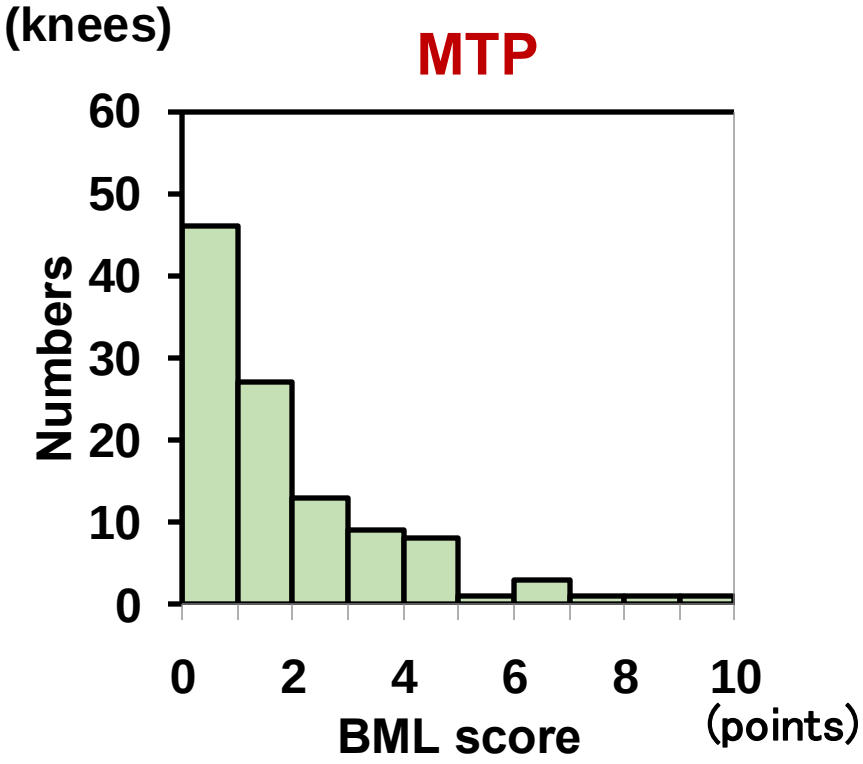
Statistical analysis

- Related factors for cartilage improvement

  <u>Logistic regression analysis</u>

Distribution of BML score





BML(+)	BML(+)
53.6%	58.2%

Change of ICRS grade after HTO

		ICRS grade				
		0	1	2	3	4
MFC	Pre-op	0	3	16	35	56
	Post-op	1	9	23	36	41
MTP	Pre-op	3	17	26	32	32
	Post-op	1	17	37	24	31

Improvement rate of MFC: 37.3%

Improvement rate of MTP: 26.4%

Improvement in either: 43.6%

(CI-group) (duplication: 85.4%)

Demographic data

	Non-CI group	CI group	P value
Patient, n	62	48	-
Age, years	58.2±7.3	57.2±10.4	0.940
Female, %	39 (62.9%)	30 (62.5%)	0.965
BMI, kg/m^2	26.8±3.3	25.3±3.1	0.013
Follow-up period , years	5.6±4.2	4.0±2.9	0.149
Opening width, mm	9.3±1.8	9.6±1.9	0.501

Mann-Whitney U test、χ^2 test

Assessment of X-ray

		No improvement in either	BML improvement on MFC	BML improvement on MTP
WBLR	Pre-op	23.6±9.5	22.2±16.0	21.8±16.2
	Post-op	52.3±10.7	55.9±7.8	54.8±7.7
MPTA	Pre-op	84.6±2.3	84.0±3.3	84.3±3.5
	Post-op	90.5±9.7	90.1±3.0	90.1±2.6
PTS	Pre-op	9.0±9.7	8.0±2.7	8.6±3.1
	Post-op	10.0±9.3	9.0±2.8	8.8±2.8

Avarage±SD

Factors associated with CI

	CI on MFC			CI on MTP		
	B	P value	Odds	B	P value	Odds
Age	-0.04	0.132	0.96	0.03	0.446	1.03
Sex	-0.39	0.381	0.68	0.78	0.164	2.19
BMI	-0.14	0.047	0.87	-0.20	0.016	0.82
Pre-op ICRS score	0.06	0.843	1.06	0.95	0.002	2.59
Pre-op BML score	0.02	0.836	1.02	-0.35	0.046	0.70
Post-op WBLR	0.05	0.036	1.05	0.05	0.124	1.05
Post-op MPTA	0.04	0.676	1.04	-0.03	0.817	0.98
Post-op PTS	-0.02	0.651	0.99	-0.01	0.880	0.99

Logistic regression analysis, dependent variable : CI on MFC, MTP

CI after HTO

This study

Low BMI and high pre-op. ICRS grade were factors associated with CI

Pre-op. BML was a negative factor for post-op. CI

- **High ICRS grade is related with CI**

  Kumagai K, et al. KSSTA 2017

- **Preop. BMI＜25.9 and postop. WBLR>54.0% are related with CI**

  Tsushima T, et al. KSSTA. 2024

- **Pre- and post-op. BML changes are not associated with CI**

  Kim JH, et al. Arthroscopy. 2024

Conclusion

Incidence of Pre-op BML were 53.6% on MFC and 58.2% on MTP.

Pre-op factors associated with CI were low BMI, high ICRS score, and low BML score.

References

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