Mid- to long-term outcomes after conservative or surgical treatment of Osteochondral Lesions of the Talus (OLT) in skeletally immature patients

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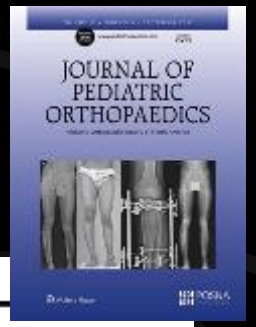
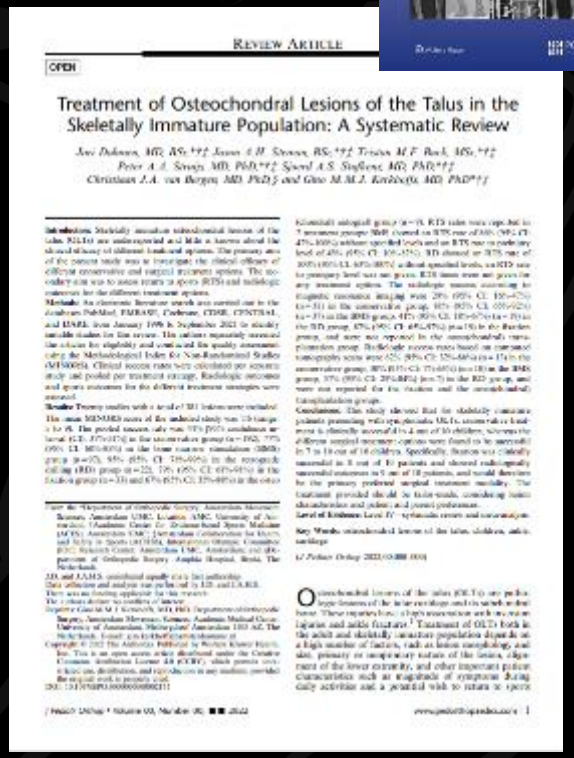
Faculty disclosures

- Nothing to disclose

Rationale and objectives

- There is limited evidence regarding outcomes of OLTs in skeletally immature patients
  - Healing potential and results may differ from adults




REVIEW ARTICLE

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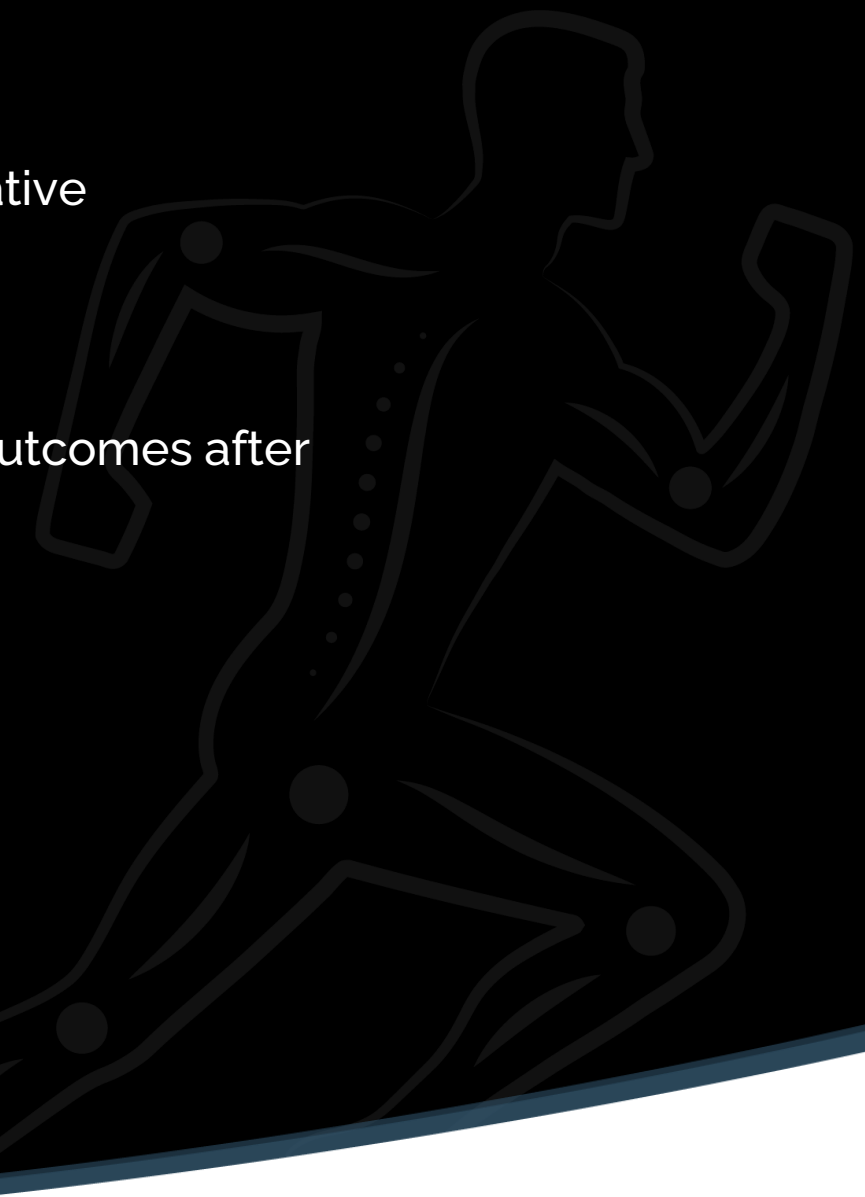
Treatment of Osteochondral Lesions of the Talus in the Skeletally Immature Population: A Systematic Review

- Results from a systematic review on clinical success rates (Dahmen et al.):
  - Conservative: 4/10
  - Fixation: 8/10
  - Other surgical treatment options: 7/10
    - BMS, retrograde drilling, osteo(chondral) transplantation

Rationale and objectives

- Primary objective:
  - To assess the conversion to surgery rate after initial conservative management

- Secondary objectives:
  - To assess and compare mid- to long-term pain and clinical outcomes after different treatment options for skeletally immature OLTs



Methods

- We included all skeletally immature patients at the moment of initial treatment (CT-verified)
  - Minimum follow-up duration of 2 years
  - Both primary and non-primary OLTs
  - Patients with concomittant injuries were excluded

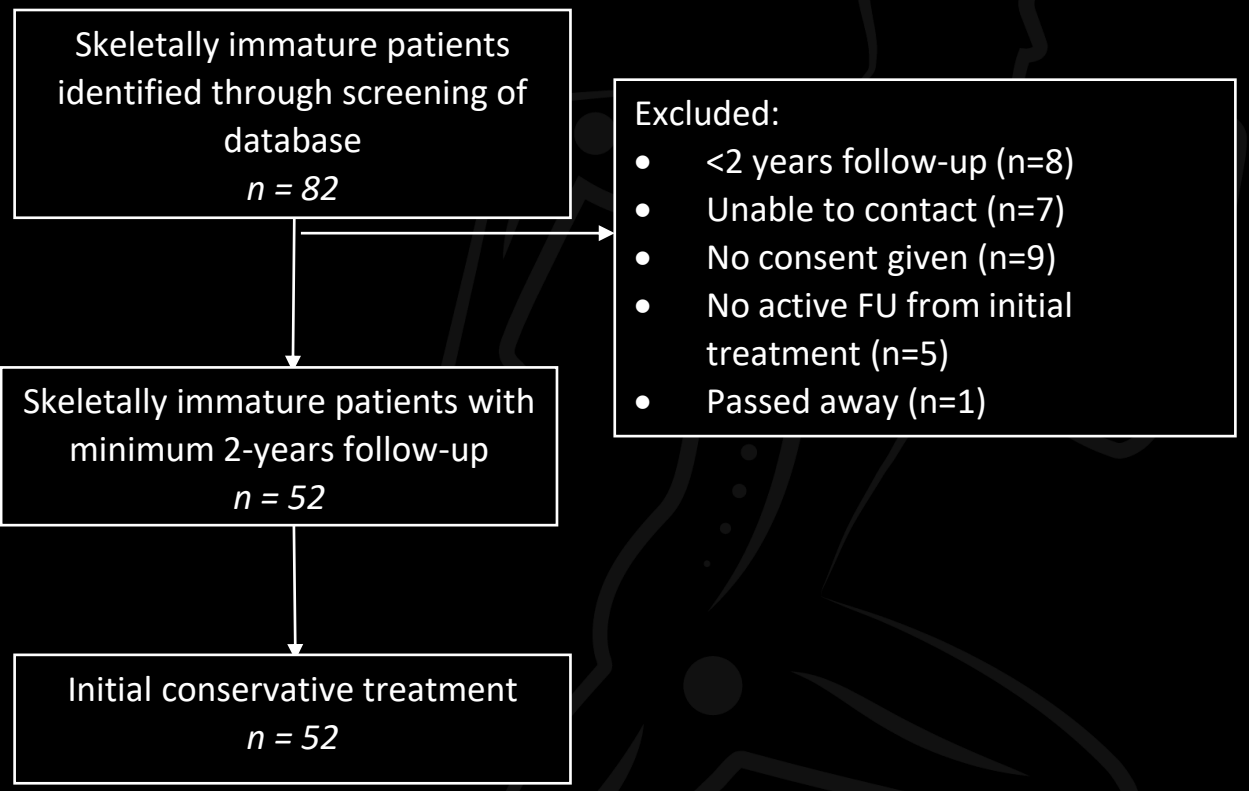
- Primary outcome
  - Conversion to surgery rate

- Secondary Outcomes
  - NRS of pain (during rest, walking, running and stairclimbing)
  - Foot and Ankle Outcome Score (FAOS)
  - Berndt and Harty outcome question
  - Short-form 36 (SF-36)
  - Patient satisfaction rate regarding the received treatment

Results

- 52 patients were included
  - 54% female
  - Mean age 13.6 years
  - Median follow-up of 81 months (range 24-265 months)

- 34 (65%) out of 52 converted to surgery
  - 18 remained conservative
  - 15 bone marrow stimulation (BMS)
  - 20 fixation



Results

- Overview and comparison of clinical outcomes per treatment group
  - n = number; IQR = inter quartile range; NRS = numeric rating scale; QOL = quality of life; ADL = activities of daily living; PCS = physical components scale; MCS = mental components scale; BMS = bone marrow stimulation; n.s. = not significant

	Conservative	BMS	Fixation	P Value
Pain scores (NRS), Median (IQR)				
NRS during weightbearing	1.0 (0-2.0)	1.0 (0-3.0)	0 (0-0.5)	n.s.
NRS in rest	0.5 (0-1.0)	0 (0-1.5)	0 (0-0)	n.s.
NRS during running	3.0 (1.0-4.0)	3.5 (0.5-6.5)	1.0 (0-2)	n.s.
NRS during stairclimbing	1.0 (0-1.5)	0.5 (0-3.5)	0 (0-0)	n.s.
FAOS scores, Median (IQR)				
Pain	94 (83.33-100)	91.8 (69.4-99.3)	97.2 (81.9-100)	n.s.
QOL	56.2 (43.75-67.2)	53.1 (31.2-89.2)	75 (56.3-93.8)	n.s.
Sport	75 (62.5-90)	82.5 (36.3-92.5)	75 (58.5-92.5)	n.s.
Symptoms	82.14 (71-91.1)	71.4 (57.1-85)	78.6 (67.9-84)	n.s.
ADL	100 (100-100)	100 (98.4-100)	100 (100-100)	n.s.
SF-36, Median (IQR)				
PCS	46.8 (37.6-49.9)	48.4 (39.0-50.8)	52.7 (49.3-53.7)	n.s.
MCS	45.1 (41.7-50.9)	55.9 (43.3-59.3)	54.8 (47.8-58.2)	n.s.
Satisfaction, n (%)				
Satisfied	12 (86%)	6 (66%)	9 (90%)	n.s.
Neutral	2 (22%)	2 (22%)	1 (10%)	n.s.
Unsatisfied	0 (0%)	1 (11%)	0 (0%)	n.s.
Would undergo treatment again, n (%)	12 (86%)	7 (78%)	10 (100%)	n.s.

Conclusions

- 65% of skeletally immature patients requiring surgical treatment for their OLT.
  - Fragmentary lesions have a higher conversion to surgery rate
  - No significant differences in type of conservative treatment

- Good mid- to long-term clinical outcomes after BMS, fixation and for the part of patients that remained conservative.
  - No significant differences between groups

References

1. Dahmen J, Karlsson J, Stufkens SAS, Kerkhoffs G. The ankle cartilage cascade: incremental cartilage damage in the ankle joint. Knee Surg Sports Traumatol Arthrosc. Nov 2021;29(11):3503-3507. doi:10.1007/s00167-021-06755-w

2. Martijn HA, Lambers KTA, Dahmen J, Stufkens SAS, Kerkhoffs G. High incidence of (osteo)chondral lesions in ankle fractures. Knee Surg Sports Traumatol Arthrosc. May 2021;29(5):1523-1534. doi:10.1007/s00167-020-06187-y

3. Rikken QGH, Kerkhoffs GMMJ. Osteochondral Lesions of the Talus: An Individualized Treatment Paradigm from the Amsterdam Perspective. Foot and Ankle Clinics. 2020/12/11/ 2020;in press, available online 11 December, 2020. doi:10.1016/j.fcl.2020.10.002doi:https://doi.org/10.1016/j.fcl.2020.10.002

4. Hinkle A, Dickason CQ, Jinguji T, et al. Prevalence and Severity of Juvenile Osteochondritis Dissecans in Patients With Juvenile Idiopathic Arthritis. Orthop J Sports Med. Feb 2021;9(2):2325967120984139. doi:10.1177/2325967120984139

5. D'Ambrosi R, Maccario C, Serra N, Ursino C, Usuelli FG. Relationship between symptomatic osteochondral lesions of the talus and quality of life, body mass index, age, size and anatomic location. Foot Ankle Surg. Aug 2018;24(4):365-372. doi:10.1016/j.fas.2017.04.011

6. Dombrowski ME, Yasui Y, Murawski CD, et al. Conservative Management and Biological Treatment Strategies: Proceedings of the International Consensus Meeting on Cartilage Repair of the Ankle. Foot Ankle Int. 2018 2018;39(1):9s-15s. doi:doi:

7. Reilingh ML, Kerkhoffs GM, Telkamp CJ, Struijs PA, van Dijk CN. Treatment of osteochondral defects of the talus in children. Knee Surg Sports Traumatol Arthrosc. Sep 2014;22(9):2243-9. doi:10.1007/s00167-013-2685-7

8. Rikken QGH, Kerkhoffs G. Osteochondral Lesions of the Talus: An Individualized Treatment Paradigm from the Amsterdam Perspective. Foot Ankle Clin. Mar 2021;26(1):121-136. doi:10.1016/j.fcl.2020.10.002

9. Dahmen J, Steman JAH, Buck TMF, et al. Treatment of Osteochondral Lesions of the Talus in the Skeletally Immature Population: A Systematic Review. J Pediatr Orthop. Sep 1 2022;42(8):e852-e860. doi:10.1097/bpo.0000000000002175

10. Hurley DJ, Davey MS, Hurley ET, et al. Paediatric ankle cartilage lesions: Proceedings of the International Consensus Meeting on Cartilage Repair of the Ankle. J isakos. Apr 13 2022;doi:10.1016/j.jisako.2022.04.001

11. Loomer R, Fisher C, Lloyd-Smith R, Sisler J, Cooney T. Osteochondral lesions of the talus. Am J Sports Med. Jan-Feb 1993;21(1):13-9. doi:10.1177/036354659302100103

12. Choi WJ, Park KK, Kim BS, Lee JW. Osteochondral lesion of the talus: is there a critical defect size for poor outcome? Am J Sports Med. Oct 2009;37(10):1974-80. doi:10.1177/0363546509335765

13. van Diepen PR, Smithuis FF, Hollander JJ, et al. Reporting of Morphology, Location, and Size in the Treatment of Osteochondral Lesions of the Talus in 11,785 Patients: A Systematic Review and Meta-Analysis. Cartilage. Feb 16 2024:19476035241229026. doi:10.1177/19476035241229026

14. Murawski CD, Jamal MS, Hurley ET, et al. Terminology for osteochondral lesions of the ankle: proceedings of the International Consensus Meeting on Cartilage Repair of the Ankle. J isakos. Apr 2022;7(2):62-66. doi:10.1016/j.jisako.2021.12.001

15. Buck TMF, Lauf K, Dahmen J, Altink JN, Stufkens SAS, Kerkhoffs G. Non-operative management for osteochondral lesions of the talus: a systematic review of treatment modalities, clinical- and radiological outcomes. Knee Surg Sports Traumatol Arthrosc. Aug 2023;31(8):3517-3527. doi:10.1007/s00167-023-07408-w

16. 2019 International Consensus Group on Cartilage Repair of the Ankle. Pediatric Ankle Cartilage Lesions: Proceedings of the International Consensus Meeting on Cartilage Repair of the Ankle. J ISAKOS 2021;

17. Reilingh ML, Lambers KTA, Dahmen J, Opdam KTM, Kerkhoffs G. The subchondral bone healing after fixation of an osteochondral talar defect is superior in comparison with microfracture. Knee Surg Sports Traumatol Arthrosc. Jul 2018;26(7):2177-2182. doi:10.1007/s00167-017-4654-z

18. Kerkhoffs GM, Reilingh ML, Gerards RM, de Leeuw PA. Lift, drill, fill and fix (LDFF): a new arthroscopic treatment for talar osteochondral defects. Knee Surg Sports Traumatol Arthrosc. Apr 2016;24(4):1265-71. doi:10.1007/s00167-014-3057-7

19. Rikken Q, Favier B, Dahmen J, Stufkens S, Kerkhoffs G. Open lift–drill–fill–fix for medial osteochondral lesions of the talus: surgical techniqueOffene Lift-drill-fill-fix-Methode bei medialen osteochondralen Läsionen des Talus: Operationstechnik. Operative Orthopädie und Traumatologie. 10/12 2023;doi:10.1007/s00064-023-00833-7

20. Gagliese L, Weizblit N, Ellis W, Chan VWS. The measurement of postoperative pain: a comparison of intensity scales in younger and older surgical patients. Pain. Oct 2005;117(3):412-420. doi:10.1016/j.pain.2005.07.004

21. Sierevelt IN, Beimers L, van Bergen CJA, Haverkamp D, Terwee CB, Kerkhoffs G. Validation of the Dutch language version of the Foot and Ankle Outcome Score. Knee Surg Sports Traumatol Arthrosc. Aug 2015;23(8):2413-2419. doi:10.1007/s00167-014-3017-2

22. Terwee CB, Bot SD, de Boer MR, et al. Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol. Jan 2007;60(1):34-42. doi:10.1016/j.jclinepi.2006.03.012

23. Dahmen J, Steman JAH, Buck TMF, et al. Treatment of Osteochondral Lesions of the Talus in the Skeletally Immature Population: A Systematic Review. Journal of pediatric orthopedics. May 20 2022;doi:10.1097/BPO.0000000000002175

24. Buck TMF, Dahmen J, Altink JN, et al. Higher Age is Associated with Lower Likelihood of Conversion to Surgery after Primary Nonoperative Treatment for Osteochondral Lesions of the Talus. Cartilage. Jan 26 2024:19476035241227357. doi:10.1177/19476035241227357

25. Kumai T, Takakura Y, Kitada C, Tanaka Y, Hayashi K. Fixation of osteochondral lesions of the talus using cortical bone pegs. J Bone Joint Surg Br. Apr 2002;84b(3):369-374. doi:Doi 10.1302/0301-620x.84b3.12373

26. Dunlap BJ, Ferkel RD, Applegate GR. The "LIFT" lesion: lateral inverted osteochondral fracture of the talus. Arthroscopy : the journal of arthroscopic & related surgery : official publication of the Arthroscopy Association of North America and the International Arthroscopy Association. Nov 2013;29(11):1826-33. doi:10.1016/j.arthro.2013.08.012

27. van Bergen CJA, Kox LS, Maas M, Sierevelt IN, Kerkhoffs GMMJ, van Dijk CN. Arthroscopic Treatment of Osteochondral Defects of the Talus: Outcomes at Eight to Twenty Years of Follow-up. JBJS. 2013;95(6):519-525. doi:10.2106/jbjs.L.00675

28. D'Ambrosi R, Maccario C, Ursino C, Serra N, Usuelli FG. Combining Microfractures, Autologous Bone Graft, and Autologous Matrix-Induced Chondrogenesis for the Treatment of Juvenile Osteochondral Talar Lesions. Foot and Ankle International. 2017 2017;38(5):485-495. doi:doi:

29. Reilingh ML, Murawski CD, DiGiovanni CW, et al. Fixation Techniques: Proceedings of the International Consensus Meeting on Cartilage Repair of the Ankle. Foot Ankle Int. Jul 2018;39(1_suppl):23s-27s. doi:10.1177/1071100718781096

30. D'Ambrosi R, Maccario C, Ursino C, Serra N, Usuelli FG. The role of bone marrow edema on osteochondral lesions of the talus. Foot and ankle surgery (no pagination), 2017. 2017 2017:229-235. doi:doi: