

Documents

Saleh, A.K.^{a b}, Yusof, N.M.^c, Attallah, A.A.^b, Elshal, E.A.^d, Khames, A.A.A.^d, Ibrahim, M.N.A.^b, Mahmoud, M.M.M.^d, Abdeltawab, G.E.^d, Abuomira, I.E.A.A.^d

Ilizarov External Fixator Versus Orthofix LRS in Management of Femoral Osteomyelitis: A Propensity Score Matched Analysis

(2024) *Indian Journal of Orthopaedics*, 58 (9), pp. 1272-1277.

DOI: 10.1007/s43465-024-01208-1

^a Department of Surgery, College of Medicine, Prince Sattam Bin Abdulaziz University, Al-Kharj, Saudi Arabia

^b Department of Orthopedic Surgery, Faculty of Medicine for Girls, Al-Azhar University, Cairo, Egypt

^c Advanced Trauma and Limb Reconstructive Surgery, Kuliyyah of Medicine, International Islamic University of Malaysia, Kuala Lumpur, Malaysia

^d Department of Orthopedic Surgery, Faculty of Medicine, Al-Azhar University, Assiut, Egypt

Abstract

Purpose: Treatment of osteomyelitis (OM) is challenging. Ilizarov bone transport is a commonly used technique for management of OM. The recently introduced limb reconstruction system (LRS) has been effectively used for management of OM. It was suggested to be easier in use and less invasive. The present retrospective study aimed to compare LRS and Ilizarov bone transport in management of femoral OM using a propensity score matched analysis. Methods: The present retrospective study included 80 consecutive patients with femoral OM. The studied patients were managed either using Ilizarov external fixator (n = 40) or Orthofix LRS (n = 40). The clinical outcome measurements included union time, limb length discrepancy, additional operative procedures, refracture and infection. Results: Patients in the LRS group were exposed to significantly higher frequency of bone transport (30.0 versus 15.0%) and lower frequency of acute compression and lengthening (10.0 versus 32.5%). Patients in Ilizarov group had significantly higher frequency of tobramycin pellets as compared to their counterparts. The studied groups were comparable regarding the operative complications including pin-tract infection, non-union at docking site and refracture. Patients in the Ilizarov had significantly shorter time to union (8.2 ± 3.2 versus 11.0 ± 5.6 months, $p = 0.012$). No statistically significant differences were found between the studied groups regarding the quality-of-life domains. Conclusions: Use of Ilizarov external fixator and Orthofix LRS devices proved to be effective and reliable. Their influences on patients' quality appear to be comparable. © Indian Orthopaedics Association 2024.

Author Keywords

Femoral osteomyelitis; Ilizarov external fixator; Limb reconstruction system; Orthofix

References

- Beck-Broichsitter, B.E., Smeets, R., Heiland, M.
Current concepts in pathogenesis of acute and chronic osteomyelitis
(2015) *Current Opinion in Infectious Diseases*, 28 (3), pp. 240-245.
25918958
- Arshad, Z., Lau, E.J., Aslam, A., Thahir, A., Krkovic, M.
Management of chronic osteomyelitis of the femur and tibia: A scoping review
(2021) *EFORT Open Review*, 6 (9), pp. 704-715.
- Conterno, L.O., Turchi, M.D.
Antibiotics for treating chronic osteomyelitis in adults
(2013) *Cochrane Database of Systematic Reviews*, 9, p. CD004439.
- Walter, G., Kemmerer, M., Kappler, C., Hoffmann, R.
Treatment algorithms for chronic osteomyelitis
(2012) *Deutsches Ärzteblatt International*, 109 (14), pp. 257-264.
22536302, 3336146
- Geurts, J.A.P., van Vugt, T.A.G., Arts, J.J.C.
Use of contemporary biomaterials in chronic osteomyelitis treatment: Clinical lessons learned and literature review

(2021) *Journal of Orthopaedic Research*, 39 (2), pp. 258-264.
33098587

- Yalikun, A., Yushan, M., Li, W., Abulaiti, A., Yusufu, A.
Risk factors associated with infection recurrence of posttraumatic osteomyelitis treated with Ilizarov bone transport technique-a retrospective study of 149 cases
(2021) *BMC Musculoskeletal Disorders*, 22 (1), p. 573.
34162362, 8223287
- Chen, C.M., Su, A.W., Chiu, F.Y., Chen, T.H.
A surgical protocol of ankle arthrodesis with combined Ilizarov's distraction-compression osteogenesis and locked nailing for osteomyelitis around the ankle joint
(2010) *Journal of Trauma*, 69 (3), pp. 660-665.
20526216
- Kliushin, N.M., Sudnitsyn, A.S., Subramanyam, K.N., George, J.
Management of neurologic deformity of the ankle and foot with concurrent osteomyelitis with the Ilizarov method
(2018) *Foot and Ankle International*, 39 (2), pp. 226-235.
29160725
- Yin, P., Zhang, L., Zhang, L., Li, T., Li, Z., Li, J., Zhou, J., Tang, P.
Ilizarov bone transport for the treatment of fibular osteomyelitis: A report of five cases
(2015) *BMC Musculoskeletal Disorders*, 5 (16), p. 242.
- Lin, C.C., Chen, C.M., Chiu, F.Y., Su, Y.P., Liu, C.L., Chen, T.H.
Staged protocol for the treatment of chronic tibial shaft osteomyelitis with Ilizarov's technique followed by the application of intramedullary locked nail
(2012) *Orthopedics*, 35 (12), pp. e1769-e1774.
23218635
- El-Rosasy, M.A.
Ilizarov treatment for pseudarthrosis of the tibia due to haematogenous osteomyelitis
(2013) *Journal of Pediatric Orthopedics. Part B*, 22 (3), pp. 200-206.
23482087
- Bibbo, C.
Reverse sural flap with bifocal Ilizarov technique for tibial osteomyelitis with bone and soft tissue defects
(2014) *Journal of Foot and Ankle Surgery*, 53 (3), pp. 344-349.
- Chou, P.H., Lin, H.H., Su, Y.P., Chiang, C.C., Chang, M.C., Chen, C.M.
Staged protocol for the treatment of chronic femoral shaft osteomyelitis with Ilizarov's technique followed by the use of intramedullary locked nail
(2017) *Journal of the Chinese Medical Association*, 80 (6), pp. 376-382.
28242358
- Kendall, J., McNally, M.
Septic arthritis of the shoulder with proximal humerus osteomyelitis, treated by Ilizarov shoulder arthrodesis
(2017) *Journal of Bone and Joint Infection*, 2 (2), pp. 90-95.
28529869, 5423580
- Yikemu, X., Tuxun, A., Nuermaimaiti, M., Abudukeyimu, A., Shayiti, A.
Effects of vacuum sealing drainage combined with ilizarov bone transport technique in the treatment of tibial traumatic osteomyelitis
(2019) *Medical Science Monitor*, 12 (25), pp. 6864-6871.

- Mangukiya, H.J., Mahajan, N.P., Pawar, E.D., Mane, A., Manna, J.
Functional and radiological outcome in management of compound tibia diaphyseal fracture with AO monolateral fixator versus Limb reconstruction system
(2018) *Journal of Orthopaedics*, 15 (1), pp. 275-281.
29657482, 5895934
- Jilani, L.Z., Shaan, Z.H., Ranjan, R., Faizan, M., Ahmad, S., Asif, N.
Management of complex non union of tibia using rail external fixator
(2020) *Journal of Clinical Orthopaedics and Trauma*, 11, pp. S578-S584.
32774032
- Tsiotsias, A., Maris, S.J., Angelis, S., Pernientakis, S., Vasilopoulou, A., Filippou, D.K., Papanikolaou, A., Apostolopoulos, A.P.
Distraction osteogenesis technique for the management of a Gustillo type I tibial shaft fracture initially managed with an intramedullary nail device
(2021) *Journal of Long-Term Effects of Medical Implants*, 31 (3), pp. 63-67.
34369724
- Yilihamu, Y., Keremu, A., Abulaiti, A., Maimaiti, X., Ren, P., Yusufu, A.
Outcomes of post-traumatic tibial osteomyelitis treated with an Orthofix LRS versus an Ilizarov external fixator
(2017) *Injury*, 48 (7), pp. 1636-1643.
28522207
- Abulaiti, A., Yilihamu, Y., Yasheng, T., Alike, Y., Yusufu, A.
The psychological impact of external fixation using the Ilizarov or Orthofix LRS method to treat tibial osteomyelitis with a bone defect
(2017) *Injury*, 48 (12), pp. 2842-2846.
29122280
- Cierny, G., 3rd, Mader, J.T., Penninck, J.J.
A clinical staging system for adult osteomyelitis
(2003) *Clinical Orthopaedics and Related Research*, 414, pp. 7-24.
- Nayagam, S.
Femoral lengthening with a rail external fixator: Tips and tricks
(2010) *Strategies in Trauma and Limb Reconstruction*, 5, pp. 137-144.
21286358, 2994627
- Guermazi, M., Allouch, C., Yahia, M., Huissa, T.B., Ghorbel, S., Damak, J., Mrad, M.F., Elleuch, M.H.
Translation in Arabic, adaptation and validation of the SF-36 health survey for use in Tunisia
(2012) *Annals of Physical and Rehabilitation Medicine*, 55 (6), pp. 388-403.
22795246
- Pallaro, J., Angelliaume, A., Dunet, B., Lavoinne, N., Tournier, C., Fabre, T.
Reconstruction of femoral bone loss with a monoplane external fixator and bone transport
(2015) *Orthopaedics & Traumatology, Surgery & Research*, 101 (5), pp. 583-587.
- Zhang, S., Wang, H., Zhao, J., Xu, P., Shi, H., Mu, W.
Treatment of post-traumatic chronic osteomyelitis of lower limbs by bone transport technique using mono-lateral external fixator: Follow-up study of 18 cases
(2016) *Journal of Orthopaedic Science*, 21 (4), pp. 493-499.
27192927
- Ren, G.H., Li, R., Hu, Y., Chen, Y., Chen, C., Yu, B.
Treatment options for infected bone defects in the lower extremities: free vascularized fibular graft or Ilizarov bone transport?

(2020) *Journal of Orthopaedic Surgery and Research*, 15 (1), p. 439.
32972459, 7513326

- Sen, C., Demirel, M., Sağlam, Y., Balci, H.I., Eralp, L., Kocaoğlu, M.
Acute shortening versus bone transport for the treatment of infected femur non-unions with bone defects
(2019) *Injury*, 50 (11), pp. 2075-2083.
31447211
- Tong, K., Zhong, Z., Peng, Y., Lin, C., Cao, S., Yang, Y., Wang, G.
Masquelet technique versus Ilizarov bone transport for reconstruction of lower extremity bone defects following posttraumatic osteomyelitis
(2017) *Injury*, 48 (7), pp. 1616-1622.
28408083
- Guo, Q., Yun, S., Lang, Z.
To explore the clinical application value of the Ilizarov bone handling technique in the treatment of tibial bone defects caused by osteomyelitis segmental resection. Alternative Therapies in Health and Medicine, 31, AT9933. Epub ahead of print
(2024) *PMID*,
- Lakhani, A., Singh, D., Singh, R.
Outcome of rail fixator system in reconstructing bone gap
(2014) *Indian Journal of Orthopaedics*, 48 (6), pp. 612-616.
25404775, 4232832

Correspondence Address

Saleh A.K.; Department of Surgery, Saudi Arabia; email: aymankamal37@gmail.com

Publisher: Springer

ISSN: 00195413

CODEN: INJOA

Language of Original Document: English

Abbreviated Source Title: Indian J. Orthop.

2-s2.0-85197708951

Document Type: Article

Publication Stage: Final

Source: Scopus

ELSEVIER

Copyright © 2024 Elsevier B.V. All rights reserved. Scopus® is a registered trademark of Elsevier B.V.

 RELX Group™