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An Analysis of the Surgical Outcomes of Interprosthetic Femur Fractures Treatment Methods

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Introduction

- Interprosthetic femur fractures (IFFs) are a rare, but complex injury.
- IFF = femur fracture between an ipsilateral total hip arthroplasty (THA) and total knee arthroplasty (TKA).[1]
- Incidence of IFFs is projected to increase as THAs and TKAs increase.[2]
- There are many treatment methods including ORIF with plate, intramedullary nail, external fixator, etc.[3]
- No consensus on best treatment modality.

Figure 1. Preoperative x-ray of an interprosthetic femur fracture

Methods

- A systematic review of retrospective studies involving IFF treatment outcomes was conducted.
- Research databases used: PubMed, Cochrane, and Embase.
- Collected patient demographics, intraoperative data, and postoperative outcomes data.
- Measured outcomes based on healing time, revision rate, complication rate, and functional scores.
- Also included a non-published retrospective study conducted at a level 2 trauma center.

Results – Patient Demographics

- 41 studies included.
- Total of 526 patients, 420 females, average age of 78.7 years old.
- Time from initial THA and TKA to IFF was 8.50 years and 8.20 years, respectively.
- Patient comorbidities included osteoarthritis, rheumatoid artheritis, juvenile rheumatoid arthritis, osteopenia, and osteoporosis.

Table 1.

Patient Demographics Across Treatment Groups

	All Groups (n = 526)	Plate (n = 406)	Prosthetic Revision (n = 57)	Femur Replacement (n = 28)	Nail/rod (n = 13)	External fixator (n = 5)	Plate + nail/rod (n = 14)	Plate + prosthetic revision (n = 3)
# of Females	420 (79.8%)	194	15	21	10	3	9	0
# of Males	91 (17.3%)	35	4	4	0	0	5	1
# of Unspecified*	15 (2.9%)	177	38	3	3	2	0	2
Avg. Age (years)	78.7	79.3	75.8	77.0	89.1	76.7	80.4	70.5

Results – Outcomes

- Overall union rate of 74.0% with mean healing time of 5.15 months (271 patients with reported healing times).
- Treatment with a plate had fastest mean healing time of 4.69 months.
- Prosthetic revision, nail/rod, and external fixator groups had mean healing times of 8.73, 6.5, and 5.1 months, respectively.
- Highest revision rates (32.1%) were among the femur replacement treatment group.

Results – Outcomes (cont.)

- Hardware failure and non-unions were the most reported complications
- 242 patients had postoperative functional outcome scores available.
- Harris Hip Scores for plate, revision, replacement, nail/rod, and plate + revision groups were 76.84, 77.14, 69.9, 77, and 78.4, respectively.

Table 2.

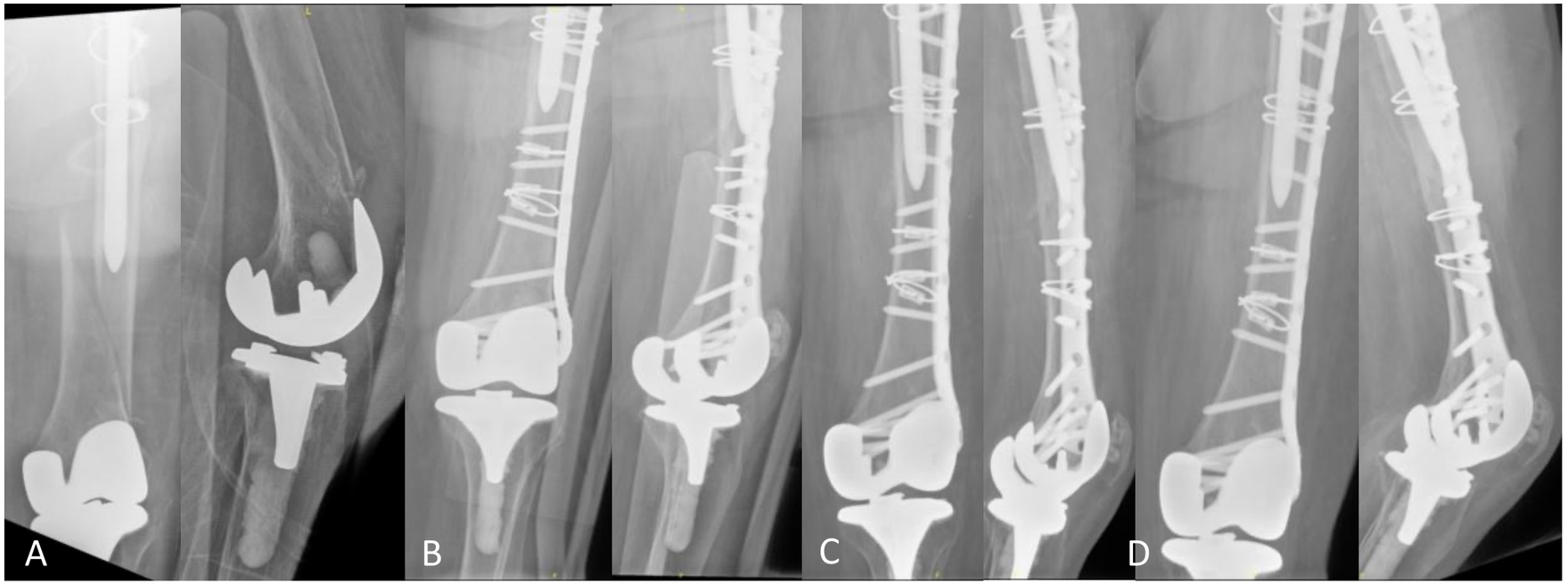
Function Scores Across Treatment Groups

	All Groups (n = 271)	Plate (n = 183)	Prosthetic Revision (n = 37)	Femur Replacement (n = 18)	Nail/rod (n = 1)	External fixator (n = 1)
HHS (n = 136)	76.15	76.84	77.14	69.9	77	/
KSKS (n = 113)	81.36	87.14	88	42.5	88	/
KSFS (n = 22)	67.5	67.5	/	/	/	/
KOOS (n = 106)	71.8	71.8	71.8	/	/	/
Parker Score (n = 106)	4.04	4.01	4.81	5	/	3.37
Katz Score (n = 50)	2.98	2.98	2.98	/	/	2.98

Legend	
HHS	Harris Hip Score
KSKS	Knee Society Knee Score
KSFS	Knee Society Function Score
KOOS	Knee Injury & Osteoarthritis Outcome Score

Figure 1.

Progression of an Interprosthetic Femur Fracture Treated with Plate



A Preoperative x-rays of IFF from fall-related injury. **B** 1-month postoperative x-rays
C 2-month postoperative x-rays. **D** Union and full-weight bearing at 4 months postoperatively

Conclusion

- Treatment method should be carefully considered by the surgeon depending on the patient and fracture classification.[4]
- While locking plate was the most common method of fixation, nail/rod and prosthetic revisions yielded favorable union rates.
- Half of the locking plate cases utilized cerclage wires/cables.
- Nearly ¾ of the patients achieved union with the fastest mean healing time of around 4.69 months.
- Although a small number of patients were treated with Ilizarov external fixator and achieved high union rates, more research needs to be conducted on this treatment method.[5-7]

Thank you to ISAKOS 2023 Congress and the University of Toledo Department of Orthopaedic Surgery!

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References

1. Lehmann W, Rupprecht M, Nuechtern J, et al. What is the risk of stress risers for interprosthetic fractures of the femur? A biomechanical analysis. Int Orthop. Dec 2012;36(12):2441–2446. https://doi.org/10.1007/s00264-012-1697-0.
2. Solarino G, Vicenti G, Moretti L, Abate A, Spinarelli A, Moretti B. Interprosthetic femoral fractures-A challenge of treatment. A systematic review of the literature. Injury. Feb 2014;45(2):362–368. https://doi.org/10.1016/j.injury.2013.09.028.
3. Stoffel K, Sommer C, Kalampoki V, Blumenthal A, Joeris A. The influence of the operation technique and implant used in the treatment of periprosthetic hip and interprosthetic femur fractures: a systematic literature review of 1571 cases. Arch Orthop Trauma Surg. Apr 2016;136(4):553–561. https://doi.org/10.1007/s00402- 016-2407.
4. Romeo NM, Firoozabadi R. Interprosthetic fractures of the femur. Orthopedics. Jan 1 2018;41(1):e1–e7. https://doi.org/10.3928/01477447-20170727-01.
5. Nozaka K, Miyakoshi N, Hongo M, et al. Effectiveness of circular external fixator in periprosthetic fractures around the knee. *BMC Muscoskel Disord*. May 21 2020;21(1): 317. https://doi.org/10.1186/s12891-020-03352-9.
6. 10 Bonnevialle P, Marcheix PS, Nicolau X, et al. Interprosthetic femoral fractures: morbidity and mortality in a retrospective, multicenter study. *Orthop Traumatol Surg Res*. Jun 2019;105(4):579–585. https://doi.org/10.1016/j.otsr.2018.07.026.
7. Pires RE, de Toledo Lourenço PR, Labronici PJ, et al. Interprosthetic femoral fractures: proposed new classification system and treatment algorithm. *Injury*. Nov 2014;45(Suppl 5):S2–S6. https://doi.org/10.1016/s0020-1383(14)70012-9.