



ISAKOS
CONGRESS
2025



MUNICH
GERMANY
June 8–11

DOUBLE-LEVEL OSTEOTOMY IN SEVERE GENU VARUM: TWO- YEAR CLINICAL ASSESSMENT

RODOLFO MORALES ÁVALOS¹, LUIS MIGUEL PACHECO GARCÍA¹

1. UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN, MONTERREY, MEXICO.

rmorales.dr@gmail.com



Faculty Disclosure Information

- The authors declare nothing to disclosure



ISAKOS
CONGRESS
2025



MUNICH
GERMANY
June 8–11

INTRODUCTION

- High tibial osteotomy can lead to complications when correcting severe varus deformities. Additionally, it can cause femoral subluxation and tension on the joint capsule, complicating future total knee arthroplasties. Due to these issues, **double-level osteotomy (DLO)** has been proposed as a better alternative in cases of severe genu varum.

REVIEW ARTICLE

OPEN ACCESS

Outcomes of double level osteotomy for osteoarthritic knees with severe varus deformity. A systematic review

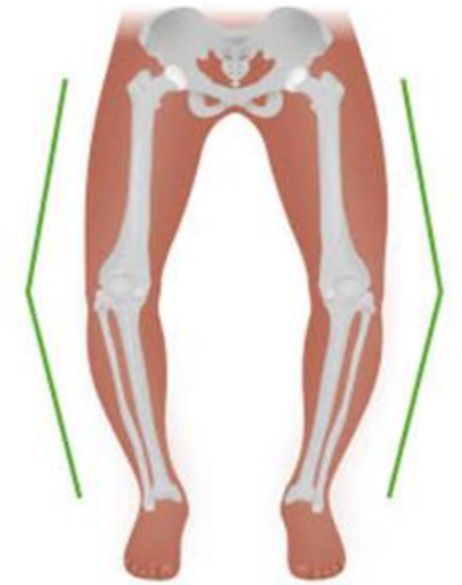
Hany Elbardey^{1,*}, André McLeod², Hazem S. Ghaith³, Samir Hakeem⁴, and Philip Housden¹

Few studies have reported the clinical follow-up of patients with double-level osteotomy (DLO).

varus deformity can also be broadly categorised into “mild” (3°–5°), “moderate” (6°–8° varus), or “severe” ($\geq 9^\circ$) [33].

OBJECTIVE:

Report and **follow up for two years** on patients with varus deformities **greater than 15°**, evaluating the effectiveness and safety of double-level osteotomy (DLO).



ISAKOS
CONGRESS
2025



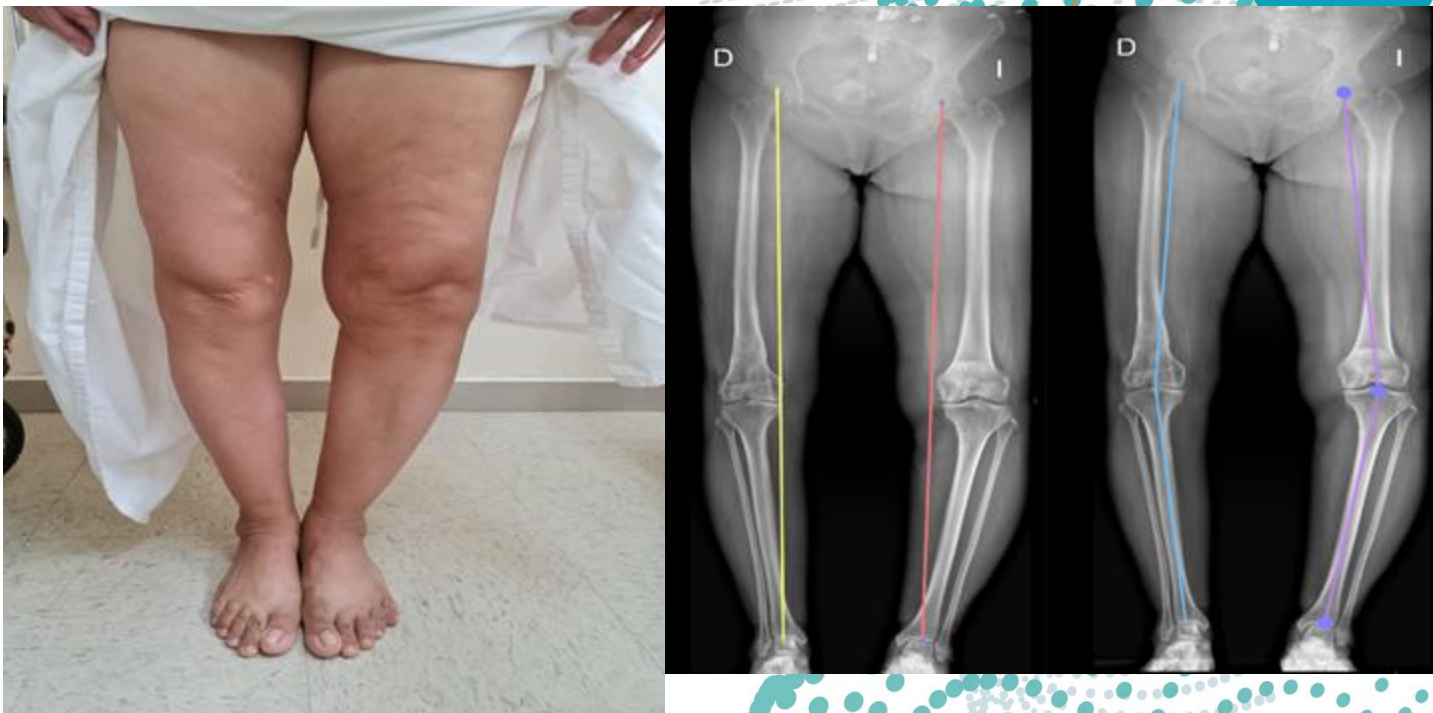
MUNICH
GERMANY
June 8–11

METHODOLOGY

Prospective, observational clinical study
30 knees with genu varum >15°, subjected to double-level osteotomy (DLO)
Clinical and radiological assessment preoperatively, at 6, 12, and 24 months postoperative.

| VARIABLES |
|---|
| Age |
| Gender |
| K&L classification |
| Mechanical Lateral Distal Femoral Angle |
| Mechanical Medial Proximal Tibial Angle |
| IKDC Questionnaire Results |
| KOOS Questionnaire Results |
| Oxford Questionnaire Results |
| Duration of Evolution |

| INCLUSION CRITERIA | EXCLUSION CRITERIA |
|------------------------------|---|
| -Adults over 18 years of age | -Previous knee surgeries on the involved knee |
| -Genu varum deformity > 15° | -Ahlback grade > 3 |
| -2 year follow-up | -Follow-up less than two years |
| | -Post-traumatic deformity |
| | -Previous knee, ankle, or hip replacement |



ISAKOS
CONGRESS
2025



MUNICH
GERMANY
June 8–11

SURGICAL TECHNIQUE



ISAKOS
CONGRESS
2025



MUNICH
GERMANY
June 8–11

RESULTS

30 knees from 30 patients (mean age 47.6 years) showed significant improvement in lower limb alignment, with successful correction of severe genu varum.

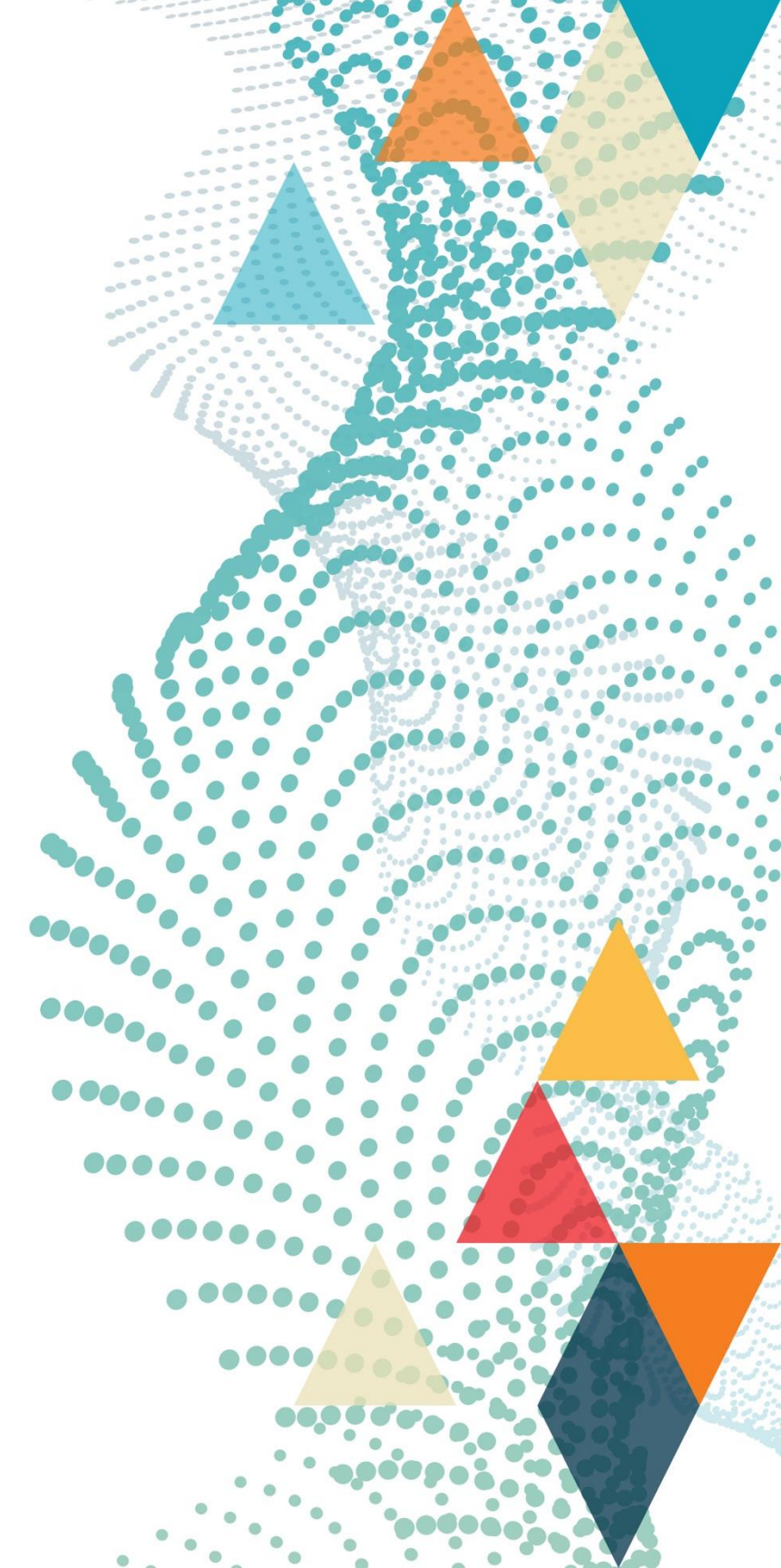
| | |
|---------------|-----------------------|
| Age (Years) | 47.6 ± 4.4 |
| Gender | F: 7 M: 23 |
| Involved Knee | Right: 18 Left: 12 |



ISAKOS
CONGRESS
2025



MUNICH
GERMANY
June 8–11





ISAKOS
CONGRESS
2025



MUNICH
GERMANY
June 8–11

CASE 2



RESULTS

| | LDFa | MPTa |
|------------------|--------|--------|
| Preoperative | 92°±2° | 84°±3° |
| 2 year follow-up | 87°±2° | 89°±2° |

| | IKDC | KOOS | OXFORD |
|--------------------|---------|--------|--------|
| Preoperative | 45 ± 10 | 40 ± 9 | 24 ± 4 |
| 6 months follow-up | 62 ± 11 | 60 ± 8 | 34 ± 3 |
| 1 year follow-up | 70 ± 10 | 75 ± 7 | 39 ± 4 |
| 2 year follow-up | 77 ± 12 | 85 ± 6 | 44 ± 3 |
| p Value | <0.001 | <0.001 | <0.001 |



ISAKOS
CONGRESS
2025



MUNICH
GERMANY
June 8–11

RESULTS

| | |
|---|---------------------|
| Surgical Time (Minutes) | 109.3 ± 4.85 |
| Intraoperative Blood Loss (Millilitres) | 80 ± 7.5 |
| Length of Hospital Stay (Hours) | 25.2 ± 1.25 |
| Time to Full Weight-Bearing (Days) | 38.29 ± 3.9 |
| Return to Work Activities (Days) | 38.54 ± 2.7 |
| Discontinuation of Walking Aid (Days) | 33.13 ± 3.7 |
| Complete Radiographic Bone Consolidation (Weeks) | 5.2 ± 0.69 |

No intraoperative complications were observed; however, there was one postoperative complication. One patient required reoperation 1 year after the initial procedure due to local irritation caused by the osteosynthesis material at the tibial osteotomy site.



CONCLUSIONS

- Double-level osteotomy has proven to be an effective and reliable treatment option for patients with severe genu varum, particularly in cases involving significant deformities.
- This approach not only addresses mechanical axis correction but also provides long-term functional improvements.
- Overall, double-level osteotomy represents a durable solution for severe genu varum, with sustained clinical and radiographic benefits observed at two-year follow-up.



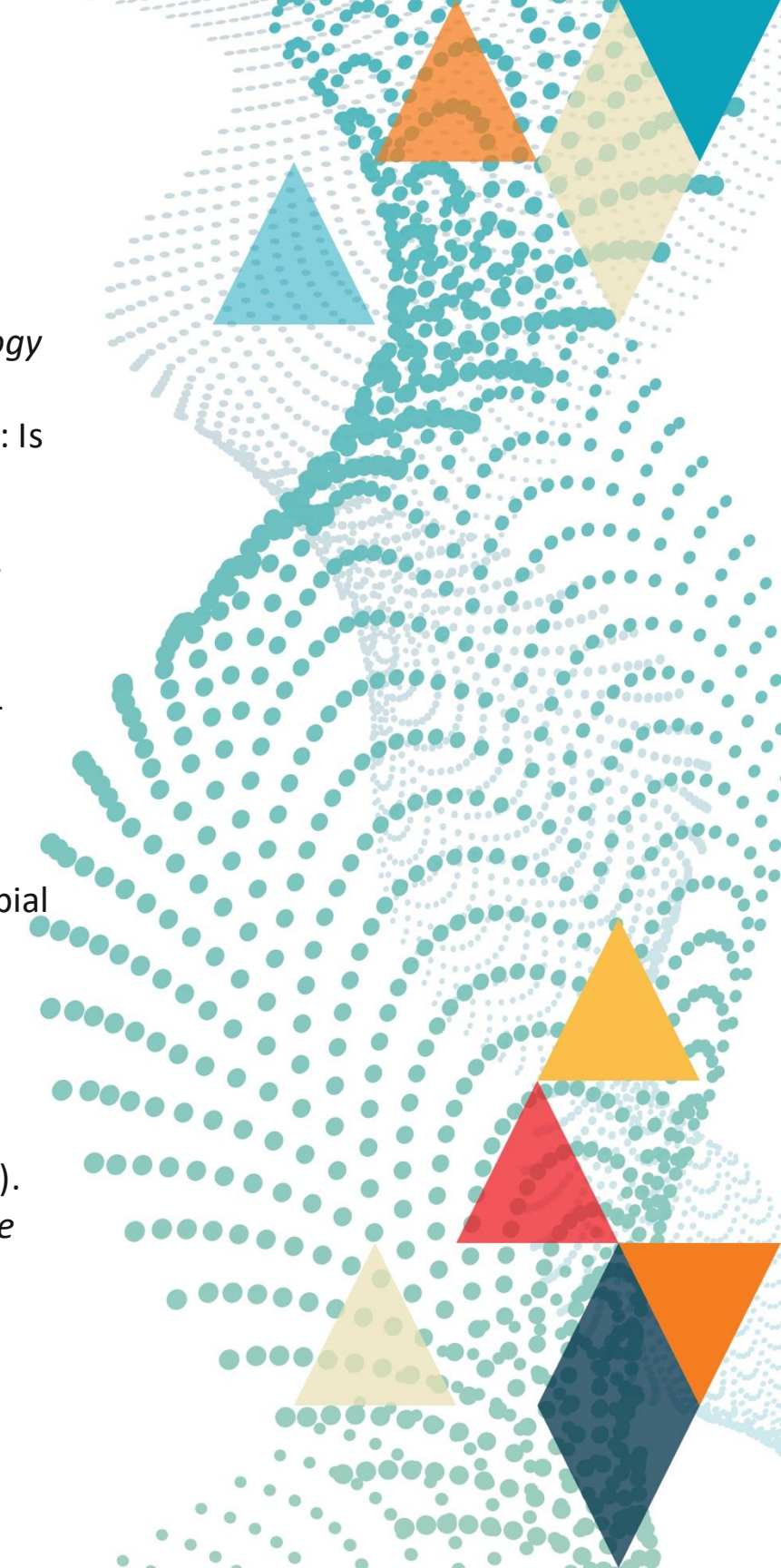
ISAKOS
CONGRESS
2025



MUNICH
GERMANY
June 8–11

REFERENCES

- Akamatsu, Y., Nejima, S., Tsuji, M., Kobayashi, H., & Muramatsu, S. (2021). Joint line obliquity was maintained after double-level osteotomy, but was increased after open-wedge high tibial osteotomy. *Knee Surgery Sports Traumatology Arthroscopy*, 30(2), 688-697. <https://doi.org/10.1007/s00167-020-06430-6>
- Caubère, A., Barbier, O., Kley, K., Hanak, L., Jacquet, C., & Ollivier, M. (2022). Double level osteotomy for genu varum: Is a return to sport possible? *Orthopaedics & Traumatology Surgery & Research*, 109(4), 103397. <https://doi.org/10.1016/j.otsr.2022.103397>
- Elbardesy, H., McLeod, A., Ghaith, H. S., Hakeem, S., & Housden, P. (2022a). Outcomes of double level osteotomy for osteoarthritic knees with severe varus deformity. A systematic review. *SICOT-J*, 8, 7. <https://doi.org/10.1051/sicotj/2022009>
- Elbardesy, H., McLeod, A., Ghaith, H. S., Hakeem, S., & Housden, P. (2022b). Outcomes of double level osteotomy for osteoarthritic knees with severe varus deformity. A systematic review. *SICOT-J*, 8, 7. <https://doi.org/10.1051/sicotj/2022009>
- Feucht, M. J., Winkler, P. W., Mehl, J., Bode, G., Forkel, P., Imhoff, A. B., & Lutz, P. M. (2020). Isolated high tibial osteotomy is appropriate in less than two-thirds of varus knees if excessive overcorrection of the medial proximal tibial angle should be avoided. *Knee Surgery Sports Traumatology Arthroscopy*, 29(10), 3299-3309. <https://doi.org/10.1007/s00167-020-06166-3>
- Harrer, J., Schenke, M., Lutter, C., Dickschas, J., Feucht, M., & Tischer, T. (2021). Double-Level Osteotomy in Severe Varus Malalignment to Optimize Knee Joint Restoration. *Video Journal Of Sports Medicine*, 1(6), 263502542110466. <https://doi.org/10.1177/26350254211046632>
- Ihle, C., Dorn, J., Ateschrang, A., Baumgartner, H., Herbst, M., Döbele, S., Histing, T., Schröter, S., & Ahrend, M. (2022). Work intensity and quality of life can be restored following double-level osteotomy in varus knee osteoarthritis. *Knee Surgery Sports Traumatology Arthroscopy*, 31(4), 1546-1555. <https://doi.org/10.1007/s00167-022-06909-4>



DANKE SCHÖN!



UNIVERSIDAD AUTONOMA DE NUEVO LEON
DR. med. RODOLFO MORALES AVALOS
rmorales.dr@gmail.com
IG: consultadelarodilladrmorales



ISAKOS
CONGRESS
2025



MUNICH
GERMANY
June 8–11

