

---

---

## ORIGINAL PAPER

---

---

# EFFECTIVENESS OF GONARTHROSIS TREATMENT IN ELDERLY PATIENTS - HTO VS TKA

N. GHEORGHIU, G. STAN, H. ORBAN

*Orthopaedics and Traumatology, Elias University Hospital, Bucharest*

### SUMMARY

Treatment of gonarthrosis is also a main economic concern, pain and disability being associated with high costs. Resource allocation is challenging in times of economic restraint. Therapeutic sanction is nuanced depending on disease stage, patients age, its option and economic possibilities of the health system. Quite often, and especially in developing countries, treatment option is on economic considerations. The aim of this study is to compare effectiveness of HTO and TKA as treatment procedures in elderly patients with gonarthrosis. This study reviewed 20 patients who underwent TKA and 15 patients who underwent HTO for degenerative arthritis of the knee. The effectiveness analysis was performed for both methods of treatment. Before and 1 year after surgery patients were interviewed by means of the EuroQol-5D and the KSS (Knee Society Score) and Range of Motion (ROM) score for knee was assessed for their individual benefit due to TKA or HTO. Statistical tests were performed using SPSS software. The median EuroQol score rose from 41% (32 - 51%) before surgery to 75% (61 - 90%) after surgery ( $p < 0,001$ ), in case of TKA, and from 43% (31 - 53%) before surgery to 61% (40 - 68%) after surgery ( $p < 0,001$ ), in case of HTO. Our study results showed a significant improvement of KSS score in both groups postoperatively. There is a most significant improvement in TKA group. The EQ score rose significantly in both groups but with a greater increase in TKA group. The TKA is the method of choice in treating knee osteoarthritis, in older patients, with better long term results, despite the fact that it is more expensive than HTO.

**Abbreviations:** HTO - high tibial osteotomy, TKA - total knee arthroplasty, KSS - Knee Society Score, ROM - Range of Motion score, EQ - EuroQol score, UKA-unicompartmental arthroplasty  
**Key words:** gonarthrosis treatment, HTO, TKA, elderly patients

### RÉSUMÉ

*L'efficacité du traitement de la gonarthrose chez les patients âgés*

Le traitement de la gonarthrose est également une préoccupation économique principale, la douleur et le handicap étant associés à des coûts élevés. L'allocation des ressources est difficile en temps de restriction économique. La sanction thérapeutique est nuancée en fonction du stade de la maladie, l'âge du patient, son option et les possibilités économiques du système de santé. Très souvent, et surtout dans les pays en développement, l'option du traitement dépend d'estimations économiques. Le but de cette étude est de comparer l'efficacité de OTH (Ostéotomie Tibiale Haute) et ATG (Arthroplastie Totale du Genou) en tant que procédures de traitement chez les patients âgés atteints de gonarthrose. Cette étude a examiné 20 patients qui ont subi une ATG et 15 patients qui ont subi OTH pour l'arthrite dégénérative du genou. L'analyse de l'efficacité a été réalisée pour les deux méthodes de traitement. Avant et 1 an après l'opération la patients ont été interrogés au moyen de la EuroQol-5D et le KSS (genou Société Score) et d'amplitude de mouvement (ROM) le score pour le genou a été évalué pour leur bénéfice individuel en raison de ATG ou OTH. Les tests statistiques ont été réalisés avec le logiciel SPSS. Le score médian EuroQol a augmenté de 41% (de 32 à 51%) avant la chirurgie pour 75% (61 - 90%) après la chirurgie ( $p < 0,001$ ), en cas de ATG, et de 43% (de 31 à 53%) avant la chirurgie à 61% (40 - 68%) après une intervention chirurgicale ( $p < 0,001$ ), en cas de OTH. Nos résultats de l'étude ont montré une amélioration significative du score KSS dans les deux groupes après l'opération. Il ya une amélioration significative dans le groupe ATG. Le score EQ a augmenté de manière significative dans les deux groupes mais avec une plus grande augmentation dans le groupe ATG. L'ATG est la méthode de choix dans le traitement de l'arthrose du genou, chez les patients âgés, aux meilleurs résultats à long terme, en dépit du fait qu'il est plus coûteux que OTH.

**Mots clefs:** traitement de la gonarthrose, HTO, TKA, patients âgés

---

Correspondence address:

Nicolae Gheorghiu, MD PhD  
Elias University Hospital, 17 Marasti Boulevard, Zip Code 011461, Bucharest, Romania  
e-mail address: ngheorghiu@hotmail.com

## INTRODUCTION

**K**nee arthritis represents a leading health issue due to its increasing incidence. Treatment of gonarthrosis is also a main economic concern, pain and disability being associated with high costs. Resource allocation is challenging in times of economic restraint. Ignorance, lack of medical education and costs are reasons of delayed addressability for medical treatment.

There are studies that have evaluated the influence of different types of treatment for gonarthrosis. Therapeutic sanction is nuanced depending on disease stage, patient's age, its option and economic possibilities of the health system. Quite often, and especially in developing countries, treatment option is on economic considerations.

Where a compromise is achieved, for economic reasons, the results can be good in the short term, but it is not known exactly the evolution in terms of cost-effectiveness. There is a risk that, although short-term results are good, long-term effectiveness of procedures be weak. Surgical treatment for gonarthrosis consists of various methods like high tibial osteotomy (HTO), unicompartmental arthroplasty (UKA) or total knee arthroplasty (TKA). HTO and UKA proved to be both cost-effective methods of treatment in gonarthrosis [1].

Total knee arthroplasty appears to be cost-effective in the US Medicare-aged population, as currently practiced across all risk groups. Policy decisions should be made on the basis of available local options for TKA [2]. Many authors discussed their results of either HTO or TKA, but few works compared effectiveness of such methods.

The aim of this study is to compare effectiveness of HTO and TKA as treatment procedures in elderly patients with gonarthrosis.

## MATERIALS AND METHODS

This study reviewed 20 patients who underwent TKA and 15 patients who underwent HTO for degenerative arthritis of the knee. All patients were older than 60 years, with a varus deformity and an arthritis Ahlback score at least 3.

A posterior cruciate ligament substituting prosthesis was used in all cases of TKA. The mean age in TKA group was 64, 7 years. The mean height and weight were 1,71 m and 73 kg, respectively. The mean age in HTO group was 62,3 years. The mean height and weight were 1,70 m and 72 kg, respectively.

The effectiveness analysis was performed for both methods of treatment. Before and at least 3 months after surgery patients were interviewed by means of the EuroQol-5D and the KSS (Knee Society Score) and Range of Motion (ROM) score for knee was assessed for their individual benefit due to TKA or HTO.

Statistical tests were performed using SPSS software, and the results were compared by the Paired Samples Test. The 0.05 level was used to denote statistical significance throughout testing.

## RESULTS

In regard to personal characteristics of age, sex, height and weight, no statistically significant differences were found between groups.

In TKA (Fig. 1) group the KSS improved from  $20,23 \pm 13,5$  to  $92,1 \pm 7,5$  points ( $p < 0.001$ ), the range of motion increased from  $74,3 \pm 25,3$  degrees to  $111,3 \pm 12,7$  degrees ( $p < 0.001$ ). In the HTO group (Fig. 2), KSS improved from  $22,46 \pm 13,6$  to  $61,7 \pm 8,6$  points ( $p < 0.001$ ), the range of motion increased from  $83,8 \pm 17,5$  degrees to  $91,6 \pm 8,4$  degrees ( $p > 0.001$ ).

The median EuroQol score rose from 41% (34 – 51%) before surgery to 74% (63 – 92%) after surgery ( $p < 0,001$ ), in case of TKA, and from 44% (31 – 53%) before surgery to 62% (42 – 68%) after surgery ( $p < 0,001$ ), in case of HTO. The results are summarized in Table 1.

## DISCUSSION AND CONCLUSION

Factors like age of the patients, level of activity or disease



Figure 1 - Pre and 1 year postoperative X Ray in TKA group



Figure 2 - Pre and 1 year postoperative X Ray in HTO group

Table 1 - Results of the study

Group	KSS		ROM		E-Q	
	pre	post	pre	post	pre	post
TKA	21,23	93,1	75,3	110,3	42%	75%
HTO	23,46	60,7	84,8	92,6	44%	62%

progression have been discussed when deciding to choose methods of treatment in gonarthrosis. In developing countries finance is leading factor in decision making. Total knee arthroplasty is an effective, but also cost-intensive health care procedure. HTO is a cheaper method of treatment. Clinical results after TKA are not uniformly excellent. There are some risk factors associated with poorer TKA outcomes. Among these are older age, female sex, comorbidities and poverty [3, 4]. Numbers of TKA performed by the surgeon are inversely associated prosthesis failure rates and procedure costs [5, 6]. There are little evidence about how patient risk factors for poor surgical outcomes affect the cost-effectiveness of TKA compared to other surgical procedures for treatment of gonarthrosis.

Colsmán et al reported their study results regarding survivorship after HTO. They found a survivorship rate of 60% with a higher complication rate in cases with HTO than those treated with unicompartmental arthroplasty [7]. Niinimäki found in his study included 3195 high HTO's performed between 1987 and 2008, in a Kaplan-Meier analysis, an overall survivorship of 89% at five years and 73% at ten years, when conversion to total knee replacement was taken as the endpoint [8]. Naudie showed that age older than 50 years was significantly associated with probability of early failure in tibial osteotomy [9]. In his study, Farfalli [10] found that the prosthesis survival rate in case of TKA after a previous HTO was 82% at 5 years (95% CI, 69% to 95%) and 76% at 10 years (95% CI, 61% to 91%), with a mean KSS score of 79.9 points at final follow-up. According to other findings this indicates that the survival rate and overall functional outcome are inferior compared to the outcome of primary TKA without a previous high tibial osteotomy [11].

According to Rodríguez the posterior stabilized prosthesis in TKA with an all polyethylene tibia had an average annual rate of failure of 0.38% and a 16-year success rate of 94.10% [12]. The TKA patients in lowest-volume hospitals (1-25 procedures) had a higher risk of revision at 5 and 8 years compared to those operated on in highest-volume hospitals [13].

All patients were older than 60 years, with a varus deformity, an arthritis Ahlback score at least 3, and with knee instability, at the time of surgery. This means that HTO indications were exceeded, and that's because of financial reasons.

Although our study results showed a significant improvement of KSS score in both groups postoperatively, there is a most significant improvement in TKA group. Patients with TKA present a significant increase in range of motion postoperatively, unlike patients with HTO who do not show significant improvement of flexion. This means that HTO procedure can not completely annihilate factors responsible for knee stiffness in contrast with TKA. The Euro-Quol assessed the quality of life pre and postoperatively in both

groups. The EQ score rose significantly in both groups but with a greater increase in TKA group.

TKA and HTO proved to be both effective procedures in treating knee osteoarthritis in older patients. The HTO can not efficiently address to knee motion problems in contrast with TKA. Overall results are more favorable in TKA group and considering known survivorship rates of procedures, the TKA is the method of choice in treating knee osteoarthritis Ahlback more than 3, in older patients, with better long term results, despite the fact that it is more expensive than HTO.

**Conflict of interest.** Nil

## REFERENCES

- Brawn C, Watters T, Mather R et al. Cost-Effectiveness Analysis of Unicompartmental Knee Arthroplasty and High Tibial Osteotomy for Treatment of Medial Compartmental Osteoarthritis (2011). *The Duke Ortop J* 1(1):27-37
- Losina E, Walensky RP, Kessler C et al. Cost-effectiveness of Total Knee Arthroplasty in the United States. (2009) *Arch Intern Med* 169 (12): 1113-21
- Katz JN, Barrett J, Mahomed NN, Baron JA, Wright RJ, Losina E. Association between hospital and surgeon procedure volume and the outcomes of total knee replacement. (2004) *J Bone Joint Surg Am* 86(9):1909-1916;
- Mahomed NN, Barrett J, Katz JN, Baron JA, Wright J, Losina E. Epidemiology of total knee replacement in the United States Medicare population. (2005) *J Bone Joint Surg Am* 87(6):1222-1228
- Taylor HD, Dennis DA, Crane HS. Relationship between mortality rates and hospital patient volume for Medicare patients undergoing major orthopaedic surgery of the hip, knee, spine, and femur. (1997) *J Arthroplasty*.n 12(3):235- 242.
- Hervey SL, Purves HR, Guller U, Toth AP, Vail TP, Pietrobon R. Provider volume of total knee arthroplasties and patient outcomes in the HCUP-Nationwide inpatient sample. (2003) *J Bone Joint Surg Am* 85(9):1775-1783
- Colsmán CS, Lazovic W, Wefer A. High tibial osteotomy versus unicompartmental joint replacement in unicompartmental knee joint osteoarthritis: 7-10-year follow-up prospective randomised study. (2001) *The Knee* 8(3): 187-194
- Niinimäki TT, Eskelinen A, Mann BS, Junnila M, Ohtonen P, Leppilähti J. Survivorship of high tibial osteotomy in the treatment of osteoarthritis of the knee: Finnish registry-based study of 3195 knees. (2012) *J Bone Joint Surg Br* 94(11):1517-21
- Naudie D, Bourne RB, Rorabeck CH, Bourne TJ. The Install Award. Survivorship of the high tibial valgus osteotomy. A 10- to 22-year followup study. (1999) *Clin Orthop Relat Res* 367:18-27.
- Farfalli LA, Farfalli GL, Aponte-Tinao LA. Complications in total knee arthroplasty after high tibial osteotomy. (2012) *Orthopedics* 35(4):464-8.
- Wilson MG, Kelley K, Thornhill TS. Infection as a complication of total knee-replacement arthroplasty. Risk factors and treatment in sixty-seven cases. (1990) *J Bone Joint Surg Am* 72(6):878-883.
- Font-Rodríguez DE, Scuderi GR, Insall JN. Survivorship of cemented total knee arthroplasty. (1997) *Clin Orthop Relat Res* 345:79-86.
- Manley M, Ong K, Lau E, Kurtz SM. Total knee arthroplasty survivorship in the United States Medicare population: effect of hospital and surgeon procedure volume. (2009) *J Arthroplasty* 24(7):1061-7.