

Comparative Evaluation of Three Different Treatment Approaches for Intertrochanteric Fracture in Advanced Age Patients

İleri Yaş Hastalarda İntertrokanterik Kırık için Üç Farklı Tedavi Yaklaşımının Karşılaştırmalı Değerlendirilmesi

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ABSTRACT

Introduction: Considering the general condition of elderly patients, it is important to treat intertrochanteric fracture along with early rehabilitation interventions. We compared the mortality and clinical outcomes among the factors of Ender nailing, proximal femoral nailing (PFN) and hemiarthroplasty in patients aged >90 years with intertrochanteric fractures.

Methods: We retrospectively evaluated the medical records of 78 patients aged >90 years who were diagnosed with intertrochanteric fracture and treated during 1997-2016 at our clinic. The patients were earlier treated with Ender nailing (n=16), PFN (n=32) and hemiarthroplasty (n=30). The mean age of the patients was 93.3 years (range: 90-104); 14 of them were men and 64 women. All patients were mobile before their fracture. The preoperative American Society Anaesthesiologists (ASA) score and the postoperative hospital stay duration, survival, mobilisation and mobilisation time were evaluated.

Results: Among the 78 patients, 60 (76.9%) eventually died and 18 (23.1%) survived. The mean survivals after surgery were 30.5, 27.2 and 21.7 months in the Ender, PFN and hemiarthroplasty groups, respectively. The overall death rates were 62.5% (n=10), 62.5% (n=20) and 100% (n=30) in the Ender, PFN and hemiarthroplasty groups, respectively. No significant difference was noted in the ASA score. The mean postoperative hospital stay durations were 8.2, 9.4 and 7.6 days in the Ender, PFN and hemiarthroplasty groups, respectively. The mean mobilisation days were 36, 4.3 and 4.8 days in the Ender, PFN and hemiarthroplasty groups, respectively. Six (37.5%) patients in the Ender, 5 (16.6%) in the hemiarthroplasty and 5 (15.6%) in the PFN groups could not walk. The Ender group was mobilised significantly late (p<0.001).

Conclusion: Although PFN is accepted as the gold standard for treating intertrochanteric fractures, different treatment

ÖZ

Amaç: Yaşlı hastaların genel durumu göz önüne alındığında, intertrokanterik kırığın erken rehabilitasyon müdahaleleri ile birlikte tedavi edilmesi önemlidir. Bu çalışmada Ender çivileme, proksimal femoral çivileme (PFN) ve hemiarthroplasti ile tedavi edilen intertrokanterik kırıklı 90 yaş üstü hastaların mortalite ve klinik sonuçları karşılaştırıldı.

Yöntemler: 1997-2016 yılları arasında kliniğimizde tedavi edilen 90 yaş üstü intertrokanterik kırık tanılı hastaların dosyaları retrospektif olarak incelendi. Ender çivisi ile 16, hemiarthroplasti ile 30, PFN ile 32 toplam 78 hastanın tedavi edildiği saptandı. Hastaların yaş ortalaması 93,3 yıl (aralık: 90-104) idi ve hastaların 14'ü erkek, 64'ü kadındı. Bütün hastalar kırık öncesi yürüyebiliyordu. Hastaların preoperative Amerikan Toplum Anestezistleri (ASA) skoru ve postoperative hastanede kalış süresi, postop yaşam süresi, mobilizasyonu ve mobilizasyon süresi değerlendirildi.

Bulgular: Hastalardan altmışının (%76,9) öldüğü, on sekizinin (%23,1) sağ olduğu saptandı. Ender grubunun %62,5'i (n=10) PFN grubunun %62,5'i (n=20) hemiarthroplasti grubunun %100'ü (n=30) öldüğü tespit edildi. Gruplar arasında ASA skoru açısından anlamlı fark saptanmadı. Postoperatif hastaneden kalış süreleri karşılaştırıldığında; Ender grubu 8,2 gün, PFN grubu 9,4 gün ve hemiarthroplasti grubu 7,6 gün olarak saptandı. Hastaların postop mobilizasyonları karşılaştırıldığında; Ender grubu ortalama 36 günde, hemiarthroplasti grubu 4,8 günde, PFN grubu 4,3 günde yürüdüğü saptandı. Ender grubunda 6 (%37,5) hasta, hemiarthroplasti grubunda 5 (%16,6) hasta, PFN grubunda 5 (%15,6) hastanın yürüyemediği saptandı. Ender grubu anlamlı olarak geç mobilize oldu (p<0,001).

Sonuç: PFN intertrokanterik kırıklar için altın standart kabul edilse de özellikle ileri yaş, osteoporotik, birden fazla ek hastalığı olan düşükün hastalarda farklı tedaviler uygulanabilir.

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options can be used, especially in patients with advanced age, osteoporotic and in those presenting with multiple comorbidities. In this study, we found that the patients treated with Ender nail had lower mortality.

Keywords: Very old patients, more than 90 years, proximal femur nail, hemiarthroplasty, Ender nail

Bu çalışmamızda Ender çivisi ile tedavi edilen hastaların daha düşük mortalitesi olduğunu saptadık.

Anahtar Kelimeler: İleri yaş hasta, 90 yaş üstü, proksimal femur çivisi, parsiyel protez, Ender çivisi

Introduction

Hip fracture is a particularly common injury in older individuals, and a past study has reported that the risk of hip fractures is 15-fold greater in individuals aged >90 years when compared with the corresponding risk in individuals aged <65 years (1). The risk of intertrochanteric hip fractures is considered to increase with an increase in the age owing to osteoporosis; therefore, such fractures can form a significant cause of morbidity and mortality in patients of advanced age, and they are known to affect the function and life of patients aged >90 years (2). The treatment of intertrochanteric fractures is extremely important, particularly in elderly patients, and early rehabilitation should be targeted to facilitate better improvement in the general condition of the patients.

Various treatment methods have been described in the literature for intertrochanteric hip fractures in elderly patients. For instance, proximal femoral nailing (PFN) and dynamic hip screws are frequently preferred for osteosynthesis. However, hemiarthroplasty is preferred to prevent non-union complications and to achieve early mobilisation, particularly in elderly (1,2).

However, the most appropriate treatment of intertrochanteric fractures in elderly patients remains unclear. The present study aimed to compare patient mortality and clinical outcomes among the factors of Ender nailing, PFN and hemiarthroplasty in patients with intertrochanteric fractures and of age >90 years.

Methods

The study design was approved by the Institutional Review Board of İstanbul University Faculty of Medicine (date: 27.07.2020, decision no: 124567). We retrospectively reviewed the medical records of all patients who were treated for intertrochanteric femur fracture during 1997-2016. Overall, 935 patients with intertrochanteric femur fracture were retrospectively investigated in this study. The medical histories and radiographic images of these patients were assessed using the data obtained from their respective medical registration files. The procedures were explained in detail to the patients, and written informed consent was obtained from them. The Social Security Administration Death Master File (Social Security Death index) was used to determine death and the date of death of the deceased patients.

In this study, the patient inclusion criteria were diagnosis with intertrochanteric femur fracture, age >90 years and past treatment with PFN, Ender nailing or hemiarthroplasty. The patient exclusion criteria were as follows: (i) diagnosis with reverse intertrochanteric femur fracture, treatment with dynamic hip screw, pathological fracture, high-

energy hip fractures or hip fractures as a result of direct blunt trauma and femoral neck fractures.

According to the treatment approach employed, the patients were divided into Ender nailing, PFN and hemiarthroplasty groups. All patients were capable of ambulation before the fracture. We evaluated the preoperative American Society of Anaesthesiologists (ASA) score, the length of postoperative hospital stay duration, postoperative survival, complications and postoperative mobilisation by reviewing the hospital records and interviewing the patients and their relatives. The data obtained were compared among the treatment groups.

Statistical Analysis

All analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 21.0 software for Windows (SPSS Inc., Chicago, IL, USA). Descriptive statistical methods were used to evaluate study data. Normality of distribution was tested using the Shapiro-Wilk test. The data were compared by One-Way ANOVA, with the statistical significance set at $p < 0.05$. For comparisons among the three groups, Tukey's range test was used among the post-hoc tests.

Results

Our study included 78 patients; of them, 16 were included in the Ender nailing group, 32 in the PFN group and 30 in the hemiarthroplasty group (Figures 1-3). The mean patient age was 93.3 years (age range: 90-104 years) and their mean ASA score was 3.1 (range: 2-4). At least one comorbidity was detected in all patients. Among the patients, 62 had hypertension, 28 had chronic heart diseases and 23 had dementia or Alzheimer's disease (Table 1).

The mean survival durations after surgery were 30.5 months (range: 1-89 months) in the Ender nailing group, 27.2 months (range: 0.4-75.7 months) in the PFN group and 21.7 months (range: 0.6-84.9 months) in the hemiarthroplasty group. Of the 78 patients, 60 (76.9%) eventually died, while 18 (23.1%) survived. The overall death rates in the respective groups were 62.5% (n=10), 62.5% (n=20) and 100% (n=30) in the Ender, PFN and hemiarthroplasty groups, respectively.

The death rates at 1-month were 12.5% (n=2), 9.4% (n=3) and 16.7% (n=5) in the Ender nailing, PFN and hemiarthroplasty groups, respectively. No difference was noted in the 1-month survival rate among the groups ($p=0.67$). The death rates at 1-year were 25% (n=4) in the Ender nailing group, 18.7% (n=6) in the PFN group and 33.3% (n=10) in the hemiarthroplasty group. No difference was noted in the 1-year survival rate among the groups ($p=0.40$). The 5-year death rates were 61.3% (n=8) in the Ender nailing group, 75.5% (n=20) in the PFN group and 86.7% (n=26) in the hemiarthroplasty group. In addition, the 5-year

survival rates were 38.7% in the Ender nailing group, 24.5% in the PFN group and 13.3% in the hemiarthroplasty group. The 5-year survival rate was significantly different among the groups ($p=0.007$; Figure 4).

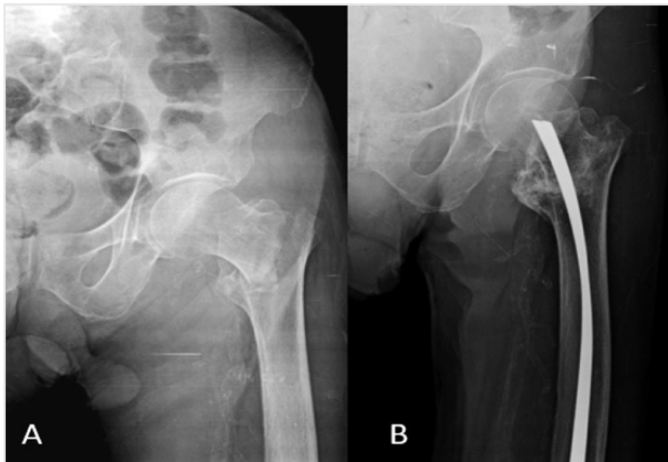


Figure 1. A 96-year-old woman with an intertrochanteric fracture being treated with Ender nailing

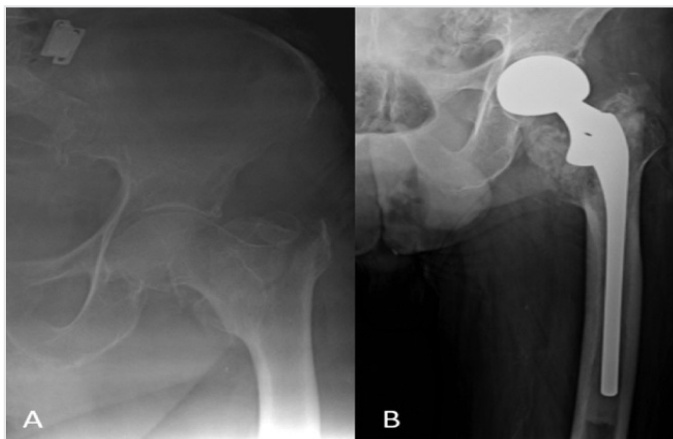


Figure 2. A 91-year-old woman with an intertrochanteric fracture being treated with proximal femoral nailing

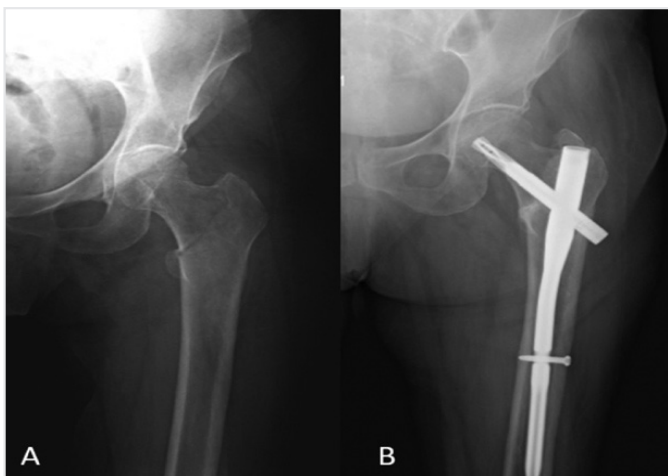


Figure 3. A 93-year-old man with an intertrochanteric fracture being treated with hemiarthroplasty

The lengths of hospital stay were 8.2 days (range: 3-18 days) in the Ender nailing group, 9.4 days (range: 2-73 days) in the PFN group and 7.6 days (range: 3-22 days) in the hemiarthroplasty group. No difference was noted in the length of hospital stay among the groups ($p=0.78$).

Patient mobilisation was attempted after a mean of 36 days (range: 3-150 days) in the Ender nailing group, 4.3 days (range: 2-10 days) in the PFN group and 4.8 days (range: 2-12 days) in the hemiarthroplasty group. Patient mobilisation could not be performed in 37.5% ($n=6$) of

Table 1. The distribution of the American Society Anaesthesiologists scores and comorbidities in the study patients

	Ender	Hemiarthroplasty	PFN	Overall n (%)
ASA Scores				
ASA 2	6	7	7	25
ASA 3	5	13	12	38.4
ASA 4	5	10	13	35.8
Comorbidities				
Hypertension	14	22	26	62
Chronic heart disease	4	12	12	28
Dementia or alzheimer	4	9	10	23
Cancer	3	2	4	9
Diabetes mellitus	4	1	4	9
Parkinson disease	2	1	2	5
Hypothyroidism	2	2	1	5
Epilepsy	1	1	1	3
Chronic kidney disease	0	3	2	5
Asthma	1	0	3	4

ASA: American Society Anaesthesiologists, PFN: Proximal femoral nailing

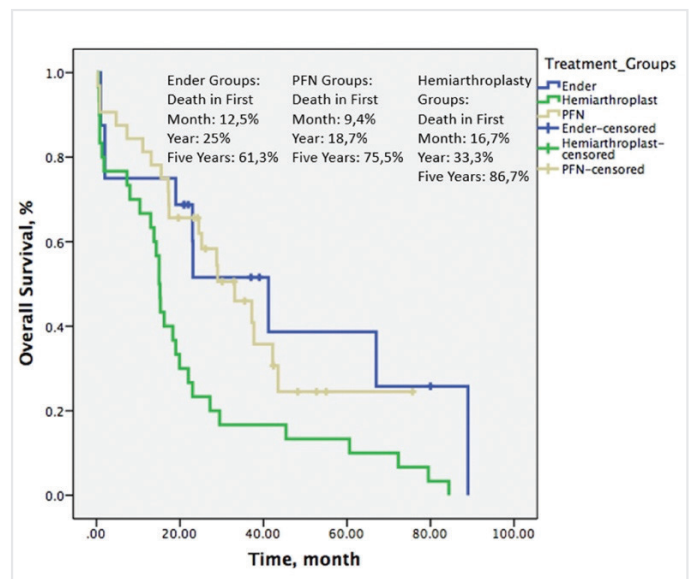


Figure 4. Comparison of the survival rate among the Ender nailing, proximal femoral nailing and hemiarthroplasty groups.

the patients in the Ender nailing group, 15.6% (n=5) of the patients in the PFN group and 16.6% (n=5) of the patients in the hemiarthroplasty group. Although no significant difference was noted in patient mobilisation between the PFN and hemiarthroplasty groups ($p=0.99$), significant differences were identified between the Ender nailing group and both the PFN ($p<0.001$) and hemiarthroplasty ($p<0.001$) groups (Table 2).

In the Ender nailing group, 6, 4 and 5 patients had an ASA score of 2, 3 and 4, respectively. In the PFN group, 7, 12 and 14 patients had an ASA score of 2, 3 and 4, respectively. In the hemiarthroplasty group, 7, 13 and 10 patients had an ASA score of 2, 3 and 4, respectively (Table 1). However, no differences were noted in the ASA scores among the groups ($p=0.40$).

In the Ender nailing group, implant failure was detected in 2 patients and an extra Ender nail was inserted in 1 patient owing to mechanical insufficiency. PFN revision was performed in 1 patient with implant failure on day 17. In another patient, removal of the implant led to implant failure, requiring conservative treatment. In the PFN group, implant failure was detected in 1 patient, but no surgical intervention could be performed because the patient's general condition had deteriorated. In the hemiarthroplasty group, no complication arose that required revision.

Discussion

The global human population is ageing; accordingly, it is assumed that orthopaedic surgeons would encounter increasing number of elderly patients with hip fractures in the future. In parallel, the number of extremely elderly patients with intertrochanteric fractures will increase in the future. The main characteristic of this patient group is the presence of comorbidities that significantly increases morbidity and mortality (3,4). However, to prevent morbidities, such as from pulmonary embolism, infection and decubitus ulcers, patients with intertrochanteric hip fractures should be mobilised with surgery as soon as possible.

Intertrochanteric fractures may cause death, unless they are treated surgically (5). Therefore, intertrochanteric fractures are preferably treated via surgical interventions if the surgical risks are not very high for the patient. Diverse operative devices have been developed for the

treatment of intertrochanteric fractures; however, there is no device available without any ensuing complications (6). In the present study, we considered the techniques of Ender nailing, PFN and hemiarthroplasty as treatment interventions.

Ender nailing has been frequently used previously as an intramedullary nailing option. Presently, orthopaedic surgeons prefer PFN to intramedullary fixation for the treatment of intertrochanteric fractures owing to the lack of rotational stability with the Ender nailing technique (7-9). Nonetheless, Ender nailing is a minimally invasive intervention associated with relatively less surgical stress and only a few complications (10).

Hemiarthroplasty is preferred because the reoperation risk is lower with this approach than with osteosynthesis options and also because the application of this approach enables early mobilisation. However, the disadvantages include a relatively long duration of surgery and high blood loss. The opinion related to hemiarthroplasty for treating intertrochanteric fractures has evolved over time. Although good outcomes have been reported by some authors, advanced age and serious osteoporosis has been reported to restrict the indications for hemiarthroplasty with the emergence of the intramedullary fixation technique (11,12). Kesmezacar et al. (13) reported that hemiarthroplasty with shorter survival and greater mortality does not offer any advantage over internal fixation, which is the only benefit of earlier weight bearing. A past prospective, randomised study comparing hemiarthroplasty with intramedullary fixation devices reported superior clinical outcomes with PFN, although the functional outcomes were similar across the methods (14).

Mortality generally occurs within the first 6 months of getting intertrochanteric fractures (15). Past studies have demonstrated that advanced age alone can increase the risk of mortality (16,17). In addition, comorbidities have significant effect on the chances of mortality. Aharanoff et al. (18) reported that the postoperative mortality rates were higher among patients with preoperative ASA scores of 3-4 than among those with ASA scores of 1-2.

In the present study, assessment of the mortality rates based on the surgical approaches employed showed no differences in the 1-month and 1-year mortality rates among the groups. However, the 5-year survival rate was significantly higher with Ender nailing than with the other approaches. Kesmezacar et al. (13) reported that the frequency of death was higher and the mean postoperative survival time was shorter with hemiarthroplasty than with osteosynthesis; however, these differences were not statistically significant. Although some studies found that arthroplasty for hip fractures was associated with a high mortality rate (19,20), others have reported that arthroplasty does not increase the mortality rate (21).

In our study, no significant differences were noted in the complications and hospital stay durations among the groups. With regard to mobilisation, we found that patients who underwent Ender nailing experienced late mobilisation. Moreover, the time until mobilisation had no effect on mortality and 20% of the patients did not even achieve mobilisation. The Ender nailing group included 6 bed-dependent patients, the hemiarthroplasty group included 5 and the PFN group included 5. Holt et al. (22) reported that 36% of the patients (from 50

Table 2. The clinical data and mortality rates of the all groups.

	Ender	Hemiarthroplasty	PFN
Hospital stay (day)	8.2 (3-13)	7.6 (3-22)	9.4 (2-73)
Dependent/mobile	6/10	5/25	5/27
Mobility time (day)	36 (3-150)	4.8 (2-12)	4.3 (2-10)
Follow-up (months)	30.5 (12-89)	21.7 (12-84.9)	27.2 (12-75)
Death/living	10/6	30/30	20/12
Mortality			
In first month	2 (12.5%)	5 (16.7%)	3 (9.4%)
In first year	4 (25%)	10 (33.3%)	6 (18.7%)
In five years	8 (61.3%)	26 (86.7%)	20 (75.5%)

PFN: Proximal femoral nailing

patients) with hip fractures aged >95 years were bed-dependent after surgery; this value is higher than that recorded in the present study (22).

We noted that the preferred treatment option had no significant effect on the length of hospital stay. Holt et al. (22) found that the mean length of hospital stay was 12 days for 50 patients aged >95 years.

The present study has some limitations. First, this study had a retrospective design and relatively small number of cases. Second, we did not evaluate the functional status postoperatively for compare among the groups. Third, in this study, we did not evaluate the stability of fracture pattern and not classify them. Lastly, other factors affecting mortality, such as postoperative stay in intensive care unit or postoperative delirium were not investigated.

Conclusion

Although PFN is regarded as the gold standard for the treatment of intertrochanteric femur fractures, different treatment options can be considered based on the osteoporotic bone structure, presence of coexisting diseases and the possibility of early mobilisation in patients with advanced age. In this study, we found that patients treated with Ender nail showed a lower rate of mortality.

Ethics

Ethics Committee Approval: The study design was approved by the Institutional Review Board of İstanbul University Faculty of Medicine (date: 27.07.2020, decision no: 124567).

Informed Consent: The study retrospectively reviewed the medical records of all patients who were treated for intertrochanteric femur fracture during 1997-2016.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions: Surgical and Medical Practices - S.S.; Concept - Ö.N.E.; Design - S.B.; Data Collection or Processing - S.B.; Analysis or Interpretation - S.S.; Literature Search - Ö.N.E.; Writing - S.B.

Conflict of Interest: No conflict of interest was declared by the authors.

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References

- Hommel A, Ulander K, Bjorkelund KB, Norrman PO, Wingstrand H, Thorngren KG. Influence of optimised treatment of people with hip fracture on time to operation, length of hospital stay, reoperations and mortality within 1 year. *Injury* 2008; 39: 1164-74.
- Meunier PJ. Prevention of hip fractures. *Am J Med* 1993; 95: 75S-85S.
- Pioli G, Barone A, Giusti A, Oliveri M, Pizzonia M, Razzano M, et al. Predictors of mortality after hip fracture: results from 1-year follow-up. *Aging Clin Exp Res* 2006; 18: 381-7.
- Zuckerman JD, Skovron ML, Koval KJ, Aharonoff G, Frankel VH. Postoperative complications and mortality associated with operative delay in older patients who have a fracture of the hip. *J Bone Joint Surg Am* 1995; 77: 1551-6.
- Levy RN CJ, Mont MA. Intertrochanteric hip fractures. Browner BD, Jupiter J, Levine AM, Trafton PG, Krettek C, editors. *Skeletal Trauma*. 1st edition. Philadelphia: WB Saunders; 1992.p.1443-84.
- Takigami I, Matsumoto K, Ohara A, Yamanaka K, Naganawa T, Ohashi M, et al. Treatment of trochanteric fractures with the PFNA (proximal femoral nail antirotation) nail system-report of early results. *Bull NYU Hosp Jt Dis* 2008; 66: 276-9.
- Raugstad TS, Mølster A, Haukeland W, Hestenes O, Olerud S. Treatment of pertrochanteric and subtrochanteric fractures of the femur by the Ender method. *Clin Orthop Relat Res* 1979: 231-7.
- Russin LA, Sonni A. Treatment of intertrochanteric and subtrochanteric fractures with Ender's intramedullary rods. *Clin Orthop Relat Res* 1980: 203-12.
- Kuderna H, Böhler N, Collon DJ. Treatment of intertrochanteric and subtrochanteric fractures of the hip by the Ender method. *J Bone Joint Surg Am* 1976; 58: 604-11.
- Claes H, Broos P, Stappaerts K. Pertrochanteric fractures in elderly patients: treatment with Ender's nails, blade-plate or endoprosthesis? *Injury* 1985; 16: 261-4.
- Rodop O, Kiral A, Kaplan H, Akmaz I. Primary bipolar hemiprosthesis for unstable intertrochanteric fractures. *Int Orthop* 2002; 26: 233-7.
- Haentjens P, Lamraski G. Endoprosthetic replacement of unstable, comminuted intertrochanteric fracture of the femur in the elderly, osteoporotic patient: a review. *Disabil Rehabil* 2005; 27: 1167-80.
- Kesmezacar H, Oğüt T, Bilgili MG, Gökay S, Tenekecioğlu Y. Treatment of intertrochanteric femur fractures in elderly patients: internal fixation or hemiarthroplasty. *Acta Orthop Traumatol Turc* 2005; 39: 287-94.
- Kim SY, Kim YG, Hwang JK. Cementless calcar-replacement hemiarthroplasty compared with intramedullary fixation of unstable intertrochanteric fractures. A prospective, randomized study. *J Bone Joint Surg Am* 2005; 87: 2186-92.
- Intiso D, Di Rienzo F, Grimaldi G, Lombardi T, Fiore P, Maruzzi G, et al. Survival and functional outcome in patients 90 years of age or older after hip fracture. *Age Ageing* 2009; 38: 619-22.
- Sexson SB, Lehner JT. Factors affecting hip fracture mortality. *J Orthop Trauma* 1987; 1: 298-305.
- Kenzora JE, Mccarthy RE, Lowell JD, Sledge CB. Hip fracture mortality: relation to age, treatment, preoperative illness, time of surgery, and complications. *Clin Orthop Relat Res* 1984: 45-56.
- Aharonoff GB, Koval KJ, Skovron ML, Zuckerman JD. Hip fractures in the elderly: predictors of one year mortality. *J Orthop Trauma* 1997; 11: 162-5.
- Davison JN, Calder SJ, Anderson GH, Ward G, Jagger C, Harper WM, et al. Treatment for displaced intracapsular fracture of the proximal femur. A prospective, randomised trial in patients aged 65 to 79 years. *J Bone Joint Surg Br* 2001; 83: 206-12.
- Gormeli G, Korkmaz MF, Gormeli CA, Adanas C, Karatas T, Simsek SA. Comparison of femur intertrochanteric fracture fixation with hemiarthroplasty and proximal femoral nail systems. *Ulus Travma Acil Cerrahi Derg* 2015; 21: 503-8.
- Tang P, Hu F, Shen J, Zhang L, Zhang L. Proximal femoral nail antirotation versus hemiarthroplasty: a study for the treatment of intertrochanteric fractures. *Injury* 2012; 43: 876-81.
- Holt G, Macdonald D, Fraser M, Reece AT. Outcome after surgery for fracture of the hip in patients aged over 95 years. *J Bone Joint Surg Br* 2006; 88: 1060-4.