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The treatment of intertrochanteric fracture: a survey on the preferred treatment used by orthopedic surgeons in Campania

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Summary

Hip fragility fractures incidence is constantly increasing, and outcomes are mostly poor in terms of both morbidity and mortality. Surgery is the treatment of choice for most hip fractures, but the choice between the various fixation devices is difficult. We conducted a survey on the treatment of trochanteric fractures among orthopedic surgeons in Campania using a Google form questionnaire. The preferred treatment was cephalomedullary distal locked nailing for most fractures, while sliding hip screws and hip replacement were limited to 31 A1.2 and 31.B2 fractures.

Key words: hip fractures, trochanteric fracture, survey, management, intramedullary nail, sliding hip screws

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Introduction

Life expectancy has constantly increased during the last 50 years in Italy [1]. The population of people aged ≥ 85 years is estimated to grow by over 12% within the year 2050 [2]. Hip fracture (HF) are associated with poor outcomes, with a one-year mortality of 25% and incomplete recovery of pre-fracture status in more than 50% of patients [3]. The incidence of HF has steadily increased in the last decades according to the progressive ageing of the population [2]. Approximately 50% of HF observed yearly in Italy are intertrochanteric.

The aim of surgical treatment in this type of fracture is to allow immediate mobilization and full weight-bearing, to aid functional recovery, and an appropriate surgery is recommended to improve these outcomes. A poorly treated HF often leads to unequal leg length, pain and irreversible mobility loss, greatly influencing the quality of life [4].

However, surgery in intertrochanteric fractures is challenging, often with reduced bone quality leading to a high risk of reoperation.

Historically, sliding compression screws (SHS) were the preferred implant [5-8], although cephalomedullary nailing (CN) has become more popular since its introduction in the 1980s [9-11].
Multiple clinical trials and meta-analyses have directly compared the two fixation devices for the treatment of these fractures [5-8,12-15], but the conclusions are mostly confusing.
In fact, no study found that one construct was clearly superior over the other [6,8,12,15-18]. Therefore, a consensus on what treatment would be most appropriate is not achievable, given the heterogeneity of fracture patterns and implant designs reported in the available literature [7,8,12,13,15].
Despite this uncertainty, data collected between 1999 and 2006 showed that CN was the preferred technique for fixation of HF, particularly among younger surgeons [2]. Considering the controversies on the choice of treatment of trochanteric fractures, we decided to investigate on current practice among orthopedic surgeons, trying to give a picture of the unmet needs of the daily practice.

Materials and methods

We conducted a cross-sectional survey study on current practices and opinions of orthopedic surgeons for the treatment of standard obliquity intertrochanteric fractures. We developed our survey questionnaire based on the available evidence and expert opinion.
A preliminary meeting was conducted by the research group to propose possible questions to include in the survey questionnaire. Only questions that could be answered in a binomial way were included and discussed. A secret voting session was performed during the meeting and those questions that had more than 55% of agreement were included.
We created a questionnaire on the Google form platform (Google LLC, Mountain View, California, United States); the questions were asked for any single type of trochanteric fracture.
The survey was distributed through email to the members of the Association of Orthopaedics and Traumatologists of Campania (Associazione Campana Ortopedici e Traumatologi Ospedalieri, A.C.O.T.O.). Residents, nonpracticing, and retired members were excluded.
Results
The questionnaire was sent to 488 members of the A.C.O.T.O., and 352 answered (72%), with the majority replying in September 2020 (66%).
The results of the survey are shown in Table I.

Table I. Results of the survey according to the fracture type. N.A: Not available. SHS: sliding hip screw.

Fracture type	Plate and screws (SHS or similar)			Short cephalomedullary nail							
	TOT.	Hip screw	Hip plus antirotational screws	TOT.	Monoaxial	Hip screw plus antirotational screws	Hip blade	Biaxial	Distal locking (yes)	Static distal locking	Dynamic distal locking
31 A1.2	22%	25%	10%	70.70%	55%	15%	2.50%	5%	65%	50%	15%
31 A1.3	4.90%	15%	2.50%	75.60%	57.50%	30%	2.50%	n.a.	85%	70%	15%
31 A2.2	7.30%	7.50%	10%	51.20%	42.50%	22.50%	n.a.	5%	62.50%	52.50%	10%
31 A2.3	12.20%	12.50%	12.50%	48.80%	37.50%	25%	n.a.	10%	57.50%	50%	13%
31 A3.1	n.a.	n.a.	n.a.	9.20%	25%	7.50%	n.a.	n.a.	27.50%	20%	7.50%
31 A3.2	n.a.	n.a.	n.a.	17.10%	25%	5%	n.a.	n.a.	27.50%	17.50%	10%
31 A3.3	n.a.	n.a.	n.a.	4.90%	15%	7.50%	n.a.	n.a.	22.50%	20%	2.50%
31 B3	22%	17.50%	12.50%	53.70%	25%	27.50%	5%	2.50%	42.50%	42.50%	n.a.
31 B2.3	4.90%	10%	5%	9.80%	10%	7.50%	2.50%	NON APPLICABILE	17.50%	20%	n.a.

Discussion

More than 30 years ago, Muhr et al. [19] highlighted the relevance of appropriate management of the geriatric patient with a trochanteric fracture. The authors stated: "instability, osteo-

porosis and the requirement of early mobilization are the main problems in comminuted intertrochanteric fractures in elderly patients".

Our aim was to evaluate the real-life practice among orthopedic surgeons in Campania to intertrochanteric fractures.

Our data showed that according to the A.C.O.T.O. members, CN are the preferred fixation device, probably because of the easy technique, biomechanical advantage, and perceived improved outcomes. These findings are in agreement with that reported in the available literature [9-11].

However, the optimal treatment of HF is still debated. Several large prospective randomized trials have directly compared SHS and contemporary CN, reporting similar outcomes [20].

In the present study, the use of SHS or hip replacement was limited to selected cases (namely 31 A1.2 and 31.B2).

A large proportion of orthopedic surgeons in Campania tend to use a distal locked nail in all types of fractures, expect in case of 31.B3, in which over 57% of surgeons did not use any type of distal locking.

Ciaffa et al. [21], in a prospective study on 212 patients, reported an incidence of peri-nail fractures of 3.3% with no differences in the three groups (without distal locking, dynamic locking, static locking) in terms of clinical, radiological outcomes, and complication rate. Their study supports the belief that short CN cannot be locked for stable (31-A1) and some unstable (31-A2) trochanteric fractures.

On the other hand, Rosenbaum et al. [22] reported that patients without distal locking presented a greater risk of fractures close to the nail.

In case of an unstable intertrochanteric fracture, double distal locking is generally preferred by the orthopedic surgeons in Campania.

Definitions of unstable fractures vary, but include those with involvement of the lesser trochanter [15,23-26], a reverse fracture line or a trochanteric comminution associated with a big posteromedial component [27,28], a broken greater trochanter [29], and lateral cortex breach [30,31]. Despite the use of current techniques and implants, treatment failure ranges from 0 to 20% [15,25,26,32-34]. Several meta-analyses [6,13,35] have suggested the absence of any difference between fixation devices. Furthermore, a primary arthroplasty might be considered, focusing on function and perioperative complication rate [36].

Regarding the type of cephalomedulary fixation (i.e.: monoaxial or biaxial; screw or blade) used by the A.C.O.T.O. members, we observed a wide difference, and the indication seems to be mostly related to their preferences.

Nherera et al. compared the results of a cephalomedullary monoxial nail with a helical blade (PFNA) with a polyaxial one (InterTan), observing that the use of the latter in unstable fractures was associated with a reduction in reoperation rate, postoperative pain, and implant-related complications. However, the authors did not find any difference in terms of fracture non-union rate and functional results [37].

The intramedullary nail has become the most common internal fixation device used worldwide thanks to its biomechanical superiority and minimally invasive application [13,15,23,26,32-35], compared to extramedullary ones, such as the sliding hip screw (SHS) [6,13,15,35,38-40] or the newer locked minimally invasive plates [25,26,39,41-43].

In a recent survey, Sciacca et al. [44] collected data from participants of an international course, grouping the results in light of the experience of the investigated group. In the "inexperienced group", surgical fixation selected for the trochanteric fractures was CN in 95%, while for SHS was 5%. Interestingly, this percentage slightly changed in the "expert group", where 56% preferred an intramedullary nail, and 38% a sliding hip screw.

Giordano et al. [45] performed a similar survey in Brazil analyzing the means of fixation of trochanteric fractures and the motivation that guide surgeons to decision making. In their survey, implant availability was the most relevant factor for the treatment decision followed by fracture classification.

Despite the increasingly sporadic use of the SHS, it is important to underline that for the same type of fracture, the plate produces fewer complications in terms of secondary fractures than the intramedullary nail.

Zhang et al. [46], conducted a systematic review, reporting that short nails are more likely to be used for stable trochanteric fractures (31-A1 and A2), and long ones for unstable reverse obliquity fractures.

Although both long (LN) and short (SN) nails have low rates of complications and mortality, the results are still controversial and the choice between them is still debated [44,47,48].

LN might have the advantage of reinforcing the entire femur and prevent peri-nail fractures by avoiding stress concentration in the distal femur and potentially reducing secondary fracture rates of the femoral shaft [49].

However, Shannon et al. observed that treatment of trochanteric fractures with both SN and LN yields comparable functional and clinical results. The authors recommended the choice of a short nail when the fracture presents a subtrochanteric extension no longer than 3 cm [50].

A Dutch survey reported that only 2% of respondents would always manage unstable intertrochanteric fractures with extramedullary plate systems, although a number of studies [6,13,15,23,26] have reported no difference in the rates after treatment with both intramedullary and extramedullary devices. However, lateral cortex breaches in A3 fractures treated with a SHS are generally associated with higher failure rates [30,41]. In a Cochrane meta-analysis [6], the use of SHS were associated with lower complication rates and without any functional advantages compared to CN.

In contrast to surgeon perception of technical ease, several authors have shown that there is a learning curve associated with CN use [10,12], and a high risk of complications (including peri-nail fractures) had been reported. These latter are an emerging entity with specific problems to face, which led some authors

to purpose a specific classification system to guide treatment [51]. The most recent Cochrane review on the treatment of pertrochanteric fractures concluded that the SHS may be a superior construct because of a decreased rate of surgical complications compared with CN [6].

Of note, complication rates after use of the newer modified nails appear to be lower in comparison to those of older nail generations [15,26,32-34,52].

Conclusions

Hip fragility fractures need to be treated surgically in most cases. However, a number of open questions remain unsolved, and their answers are not always easy and intuitive. However, they can be rationally addressed with the tools of evidence-based medicine.

Different ways of treatment have been reported in the literature for trochanteric fractures, and in current practice the management of these fractures can be extremely different between surgeons and also depend on the surgeon's experience and philosophy.

Our survey is an interesting tool to analyze current practice and to evaluate where we educational efforts should be concentrated to improve current practice, with the final aim of improving outcomes of HF.

Ethical consideration

Not applicable for this type of study.

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Conflict of interest

The Authors declare that they have no conflict of interest.

Author contributions

RP, GT and GB conceived the study. GE collected data. RP, GT, GE and AP analyzed and interpred retrieved data. RP and GT wrote the first draft. GB, AM and AP supervised the entire process. All authors red and approved the final draft of the paper.

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