Epidemiology of hip fractures in Argentina

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ABSTRACT
The Morbidity and Mortality Committee of the Argentine Association of Orthopedics and Traumatology draw up a structured questionnaire on hip fractures, in order to characterize this pathology in Argentina. After receiving data on the first 1000 cases, we prepared this descriptive report. In Argentina, the estimated hip fracture prevalence is approximately 264/100,000 inhabitants. These injuries were more frequent in women, with a female-to-male ratio of 2.7:1. Eighty percent of patients were older than 70 years an presented with multiple comorbidities (the most common being high-blood pressure, diabetes, anemia, and osteoporosis). Sixty percent of patients were able to walk indoors independently. The incidence of intertrochanteric and femoral neck fractures was 53% and 47%, respectively. The postoperative complication rate was approximately 13%, infection being the most common. The mortality rate during the first months ranged between 3.8% and 4.85%.
Key words: Hip fracture; morbidity; mortality; prevalence; epidemiology.
Level of Evidence: IV

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RESUMEN
La Asociación Argentina de Ortopedia y Traumatología a través del Comité de Morbi-Mortalidad confeccionó una encuesta sobre fracturas de cadera, con el fin de caracterizar este cuadro en nuestro país. Al completarse las primeras 1000 encuestas se elaboró este informe descriptivo. Se estima que, en la Argentina, la prevalencia de fracturas de cadera es de aproximadamente 264/100.000 habitantes. Estas lesiones resultaron más frecuentes en mujeres que en hombres (relación 2,7:1). El 80% de los pacientes tenía >70 años y múltiples comorbilidades (hipertensión arterial, diabetes, anemia y osteoporosis, entre las más frecuentes). El 60% deambulaba solo dentro del domicilio. La incidencia de fracturas intertrocantéricas y mediales fue similar: 53% y 47%, respectivamente. La tasa de complicaciones posoperatorias fue de aproximadamente el 13%, y la infección fue la complicación más frecuente. La tasa de mortalidad en los primeros meses posteriores a la cirugía osciló entre el 3,8% y el 4,85%.
Palabras clave: Fractura de cadera; morbilidad; mortalidad; prevalencia; epidemiología.
Nivel de Evidencia: IV

INTRODUCTION

Hip fractures have a great impact on morbidity and mortality, especially in the elderly, and constitute a worldwide public health issue.

In Argentina, although we lack relevant federal statistical reports, a 2013 report on the population in Latin American states that Argentine hip fracture incidence was approximately of 264/100,000 inhabitants.[1] In a more recent study (2020) on hip fractures in Latin America, Argentina's annual incidence for women was 298/100,000, and 118/100,000 for men.[2]

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Not unlike the rest of the world, for decades the top of the Argentine population pyramid is becoming wider, with increase an increase in life expectancy and, thus, in the aging population.[3] Therefore, the incidence of these fractures is expected to rise.

The Argentine Association of Orthopedics and Traumatology via his Morbidity and Mortality Committee has been producing a series of structured questionnaires over the last years to evaluate different prevalent conditions associated with our orthopedic practice; among them, hip fractures. This structured questionnaire was the result of a joint effort between the Morbidity and Mortality Committee, the Argentine Association of Orthopedics and Traumatology, the Argentine Association for the Study of the Hip and Knee, and the Argentine Orthopedic Trauma Association. Members of the Argentine Association of Orthopedics and Traumatology may access the structured questionnaire through the Association web page (https://aaot.org.ar/certificacion/comite-de-morbi-mortalidad/).

The questionnaire covers multiple aspects of the patients with hip fracture, including demographics, level of physical activity before the fracture, living conditions, and comorbidities.

Other significant aspects included are preoperative variables (hematocrit, hemoglobin, ASA score) and fracture type, hospital stay (total days, preoperative delay, etc.), type of management, complications, mortality rate, and other characteristics.

We received 1000 completed questionnaires up to and including December 2019. After data analysis was made, we began preparing the report, which was divided into two parts. In this first part, we present the descriptive analysis of the reported demographics, preoperative aspects, types of fracture and treatments, complications, and mortality rates. The second part will include the comparative analysis study between fracture types and subtypes, and between their associated managements and complications.

REPORT (FIRST PART)

Questionnaire answers obtained from 34 health centers of different Argentine regions. The 1000 completed questionnaires were composed of 597 (59.7%) from the Public Healthcare System and 403 (40.3%) from the private sector.

Demographics

The study of sex incidence shows that 735 (73.5%) fractures were sustained by women and 265 (26.5%) by men; a female-to-male ratio of 2.7:1. Figure 1 shows the study hip fracture age distribution. It is worth noting that 80% were older than 70 years and 51% were older than 80 years.

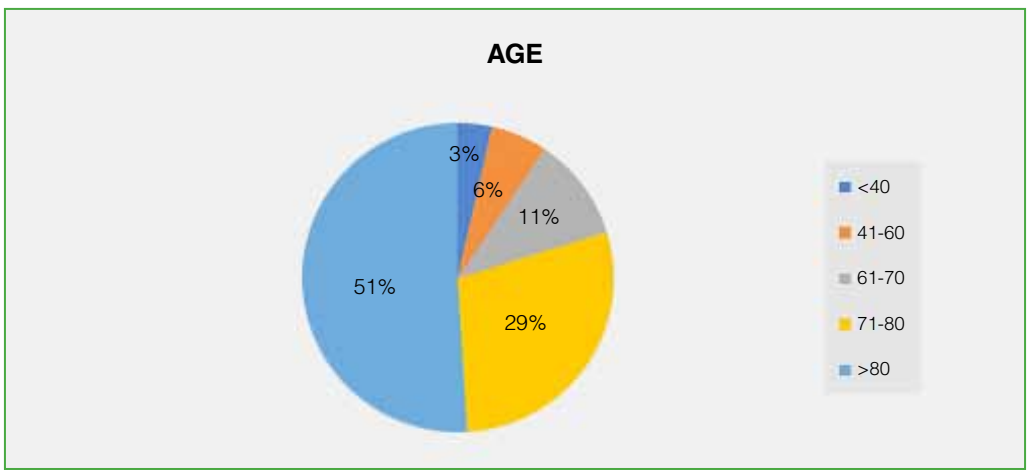

Figure 1. Hip fracture age distribution.

Living condition and level of physical activity before the fracture

In the context of habitation conditions, three-fourths of patients did not live alone and 20% lived in institutionalized care.

The evaluation of physical activity before the fracture showed that more than half of patients were able to walk indoors independently while more than a third of patients required aid for walking (Table 1).

Table 1. Accommodation conditions and walking ability before injury

	Lived alone	Institutionalized	Walked indoors	Walked with an aid
Yes	243 (24.3%)	196 (19.6%)	589 (58.9%)	366 (36.6%)
No	757 (75.7%)	794 (7.94%)	(411-41.1%)	634 (63.4%)

Comorbidities

The most common comorbidities of this series were high-blood pressure, osteoporosis, heart failure, and diabetes (Table 2).

Table 2. Patients' comorbidities at the time of fracture

Comorbidity	n
High-blood pressure	671 (67.1%)
Osteoporosis	178 (17.8%)
Diabetes (I and II)	117 (11.7%)
Heart failure	116 (11.6%)
Gastritis	87 (8.7%)
Dementia	80 (8%)
Parkinson's disease	60 (6%)
Renal failure	47 (4.7%)
Urinary incontinence	32 (3.2%)
Allergy	24 (2.4%)
Rheumatoid arthritis	23 (2.3%)
Hypothyroidism	23 (2.3%)
Asthma	16 (1.6%)
Stroke	14 (1.4%)
Chronic obstructive pulmonary disease	13 (1.3%)
Gastric ulcer	12 (1.2%)
Smoking habit	10 (1%)
Depression	6 (0.6%)
Obesity	2 (0.2%)
Others: arrhythmia, hypothyroidism, glaucoma, cancer	

Mechanism of injury

Mechanisms of injury were divided into three groups considering the energy level: high-energy (e. g., motor-vehicle accident), medium-energy (e. g., bicycle fall), and low-energy traumas (e. g., standing-height fall). Low-energy traumas accounted for the highest incidence level by a considerable margin (Figure 2).

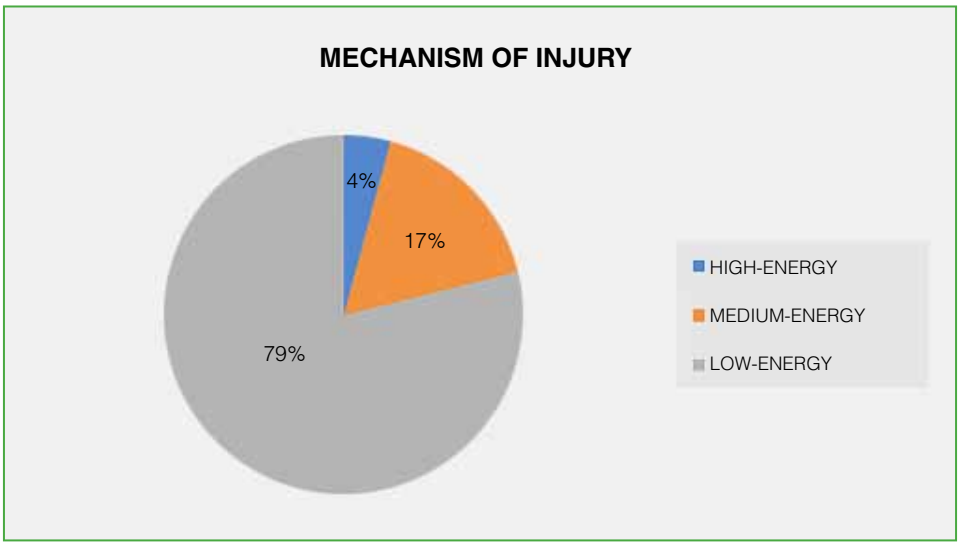

Figure 2. Fracture mechanism of injury.

Type and subtype of fractures

The questionnaire uses two classification systems to characterize fractures: Garden classification for femoral neck fractures, and Evans classification for intertrochanteric fracture.

We excluded 51 (5.1%) out of the 1000 answers due to fracture classification errors (21 lacked classification and 30 were both femoral neck and intertrochanteric fractures—double classification). After exclusion, the analysis comprised 949 fractures: 505 (53.21%) were intertrochanteric fractures, and 444 (46.78%) were femoral neck fractures. Figures 3 and 4 show the subtype distribution according to each classification system.

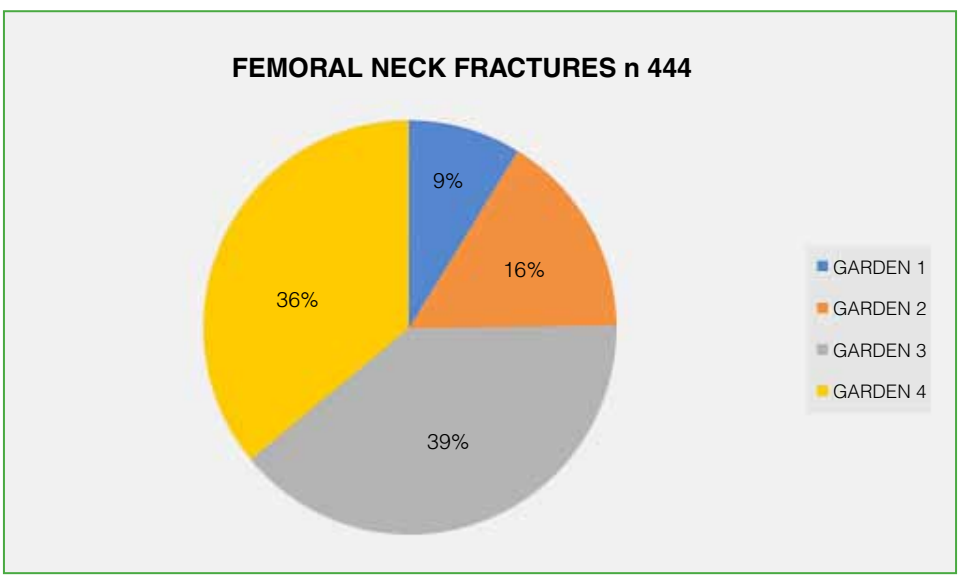

Figure 3. Femoral neck fracture subtype distribution according to Garden classification.

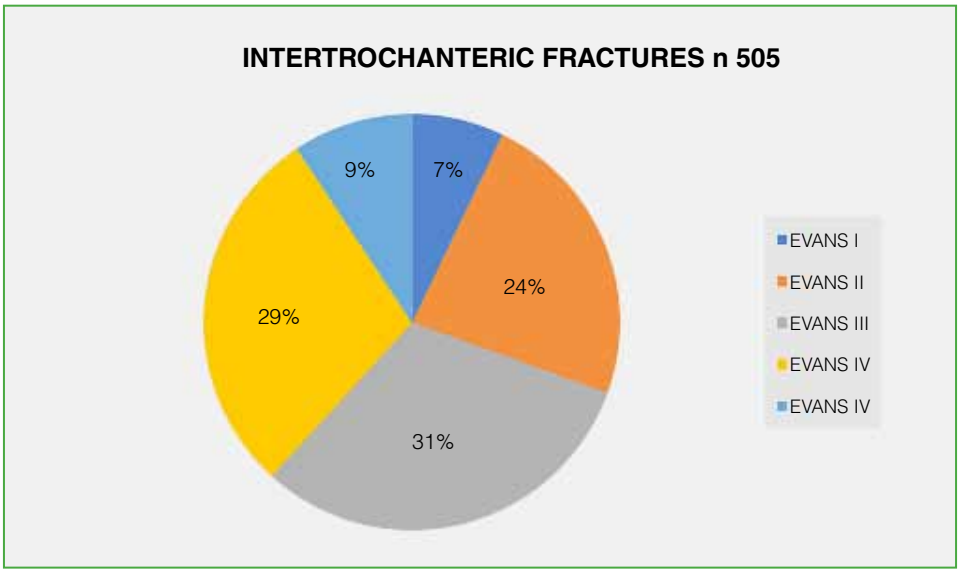

Figure 4. Intertrochanteric fracture subtype distribution according to Evans classification.

Preoperative profile

The analyzed preoperative variables were: hematocrit, hemoglobin, and the American Society of Anesthesiologists (ASA) score as a predictive factor for perioperative and postoperative complications. Following this scoring system, ASA classes 1 and 2 patients were considered low risk, and ASA classes 3 and 4 patients were considered high risk. The 844 answers on the ASA score included 486 high-risk patients (57.58%) and 372 low-risk patients (42.41%). Mean hematocrit of the 949 included answers was 33.3% (range, 19.7-42). Mean hemoglobin was 12.95mg/dL (range, 6.5-19). Patients with hemoglobin levels <12g/dL were defined as anemic patients, resulting in 49.6% of anemic patients.

Hospital stay characteristics

The questionnaire documented the days of preoperative delay (from admission to surgery) and of the complete hospital stay (from admission to discharge). Data shows that 45.28% of patients underwent surgery before the sixth day of hospital stay and more than 25% underwent surgery after the tenth day.

Half of the patients had a hospital stay of 10 or fewer days (Table 3).

Table 3. Hospital stay description

Days	Preoperative delay (901 answers) n	Total hospital stay (915 answers) n
0-5	408 (45.28%)	190 (20.76%)
6-10	265 (29.41%)	304 (33.22%)
11-20	169 (18.75%)	295 (32.24%)
>20	59 (6.54%)	126 (13.77%)

TREATMENT

Treatment method was divided into two major groups: fixation and arthroplasty. The questionnaire presented physicians with four fixation options: cannulated screws, cephalomedullary nails, sliding screw-plate, and others.

Arthroplasty options were three: unipolar prosthesis, bipolar prosthesis, and total hip replacement. For patients undergoing arthroplasty, participants were asked whether antibiotic-impregnated cement was used or not. For both methods, participants were asked to state hardware origin, Argentine or otherwise, and whether postoperative drainage was used or not.

The 444 answers with femoral neck fractures included: 77.25% of patients treated with arthroplasty; 22.29% with fixation; and 0.45% with Girdlestone resection arthroplasty (1 patient) and with conservative therapy (1 patient).

Fixation and arthroplasty hardware was of Argentine origin in 91.08% and 88.04%, respectively. Figure 5 shows the different types of treatment.

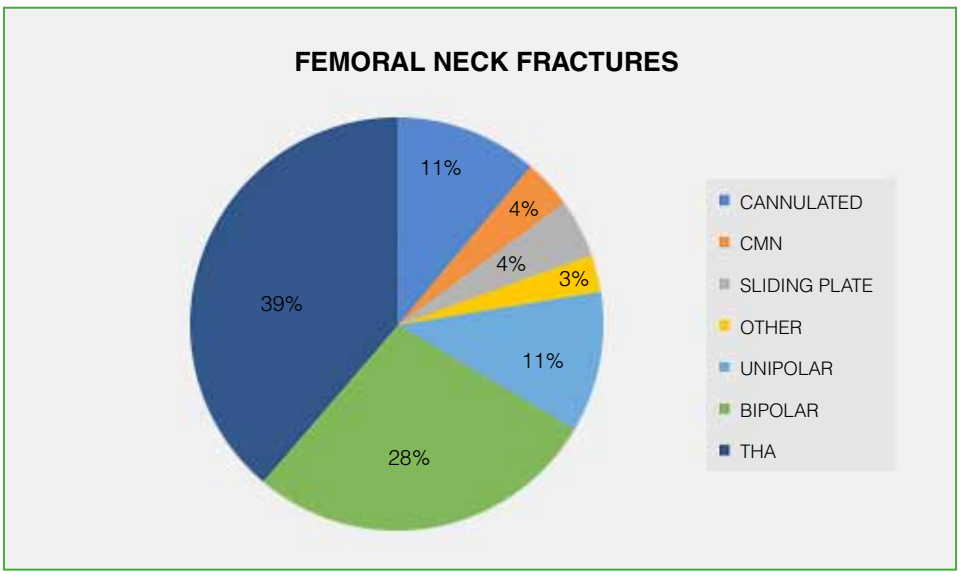

Figure 5. Femoral neck fracture management distribution.

Antibiotic-impregnated cement was used in 43.14% of all arthroplasties. Postoperative drainage was used in 52.31% of patients.

The 505 answers with intertrochanteric fractures included: 80.2% of patients treated with fixation; 19% with arthroplasty; and 0.79% with conservative therapy (3 patients). Fixation and arthroplasty hardware was of Argentine in 87.04% and 88.54%, respectively. Antibiotic-impregnated cement was used in 69.79% of all arthroplasties. Postoperative drainage was used in 14.64% of patients.

Figure 6 shows the different types of treatment for intertrochanteric fractures. Table 4 shows relative values comparing treatment options in terms of fracture type.

Time to postoperative walking

The time period was divided into days. Data show that half of the patients began walking before postoperative day 5 and 10% did not return to walk (Figure 7).

Relationship between this parameter and the type of treatment in terms of fracture type will be covered in the second part of the report.

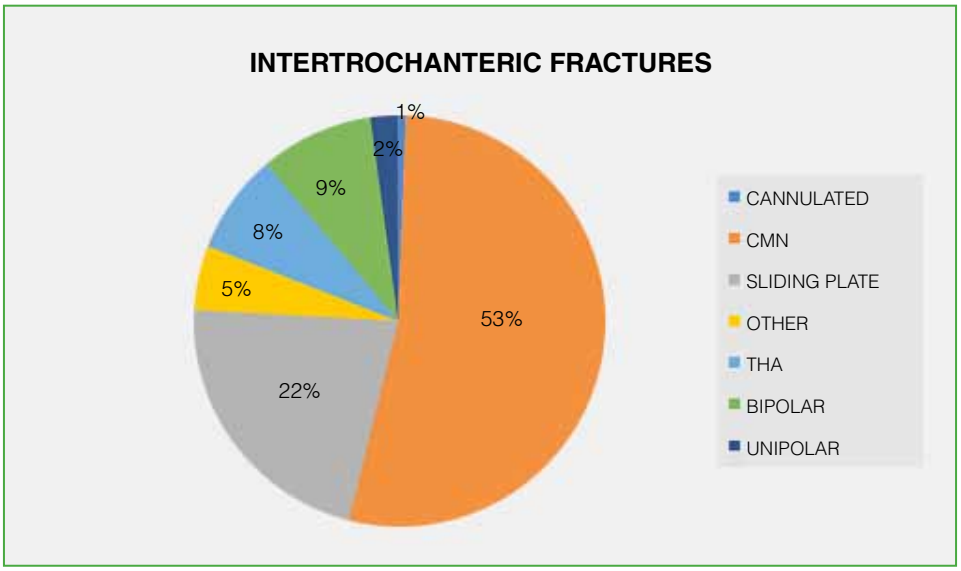

Figure 6. Intertrochanteric fracture management distribution.

Table 4. Relative values comparing treatment in terms of intertrochanteric and femoral neck fractures

Treatment	Fixation	Arthro-plasty	Cephalomed-ullary nail	Sliding screw-plate	Can-nulated screw	Total hip replace-ment	Bipolar pros-thesis	Unipo-lar pros-thesis
Femoral neck fractures n = 444	22,29	77,25	4	4	11	39	28	11
Intertrochan-teric fracture n = 505	80,2	19	53	22	1	8	9	2

Figure 7. Time to return to walk distribution.

Hematocrit, hemoglobin and postoperative blood transfusions

Answers including hematocrit values were 903, and 811 including hemoglobin values, and their mean values were 29% (range) and 10.62mg/dL (range), respectively.

Approximately a third of patients (28.8%) required postoperative RBC transfusion.

Antithrombotic prophylaxis

This item was completed in 908 cases: 95.67% were administered postoperative antithrombotic treatment, enoxaparin being the most common agent used (Figure 8).

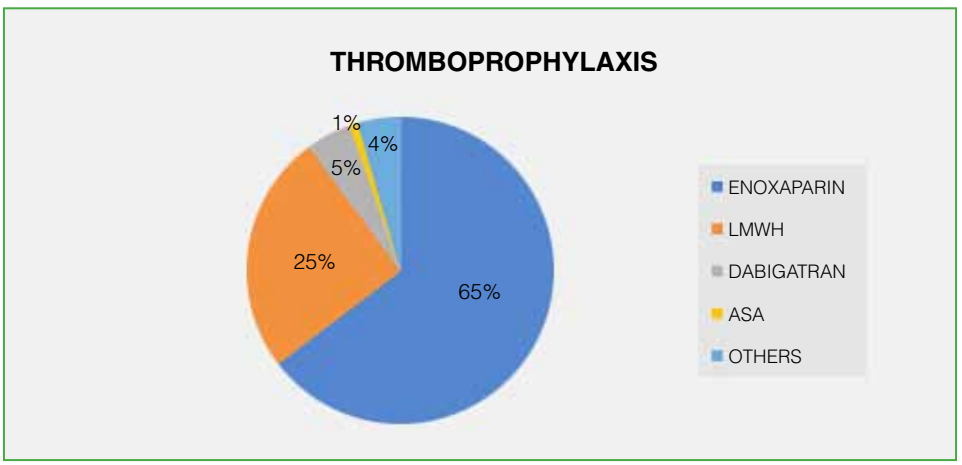

Figure 8. Distribution of thromboprophylaxis drugs.

Antibiotic prophylaxis

According to 879 answers, the most commonly used antibiotics were first-generation cephalosporins (69.62%) (Figure 9).

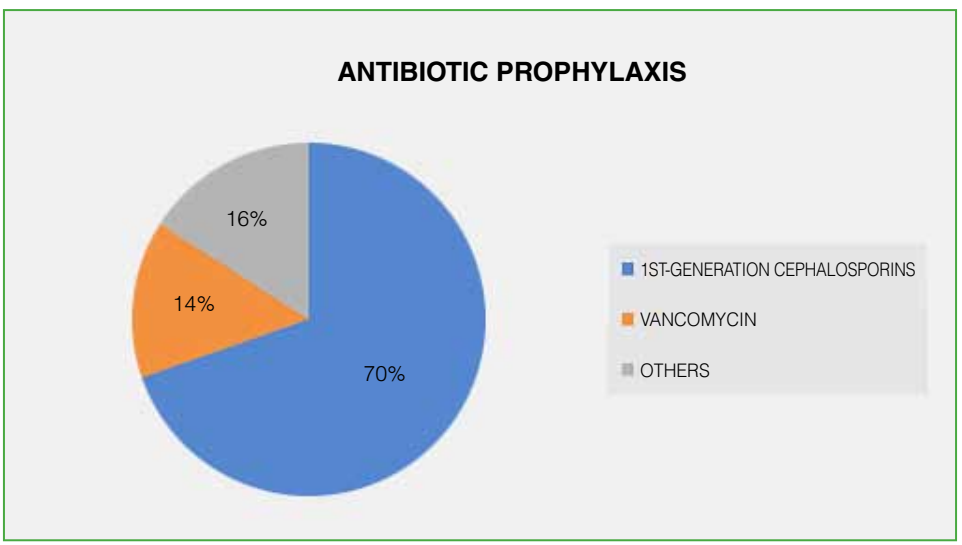

Figure 9. Distribution of perioperative antibiotic prophylaxis (others: cephalosporins, clindamycin, amikacin, colistin, voriconazole, etc.)

Postoperative follow-up

This item was completed in 613 cases: 45.67% had postoperative follow-up periods that exceeded 4 months (Figure 10).

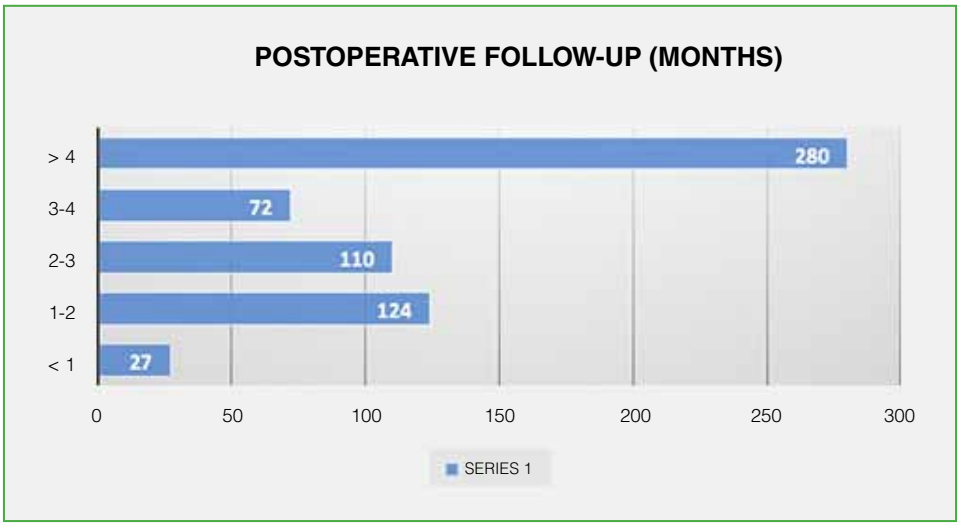

Figure 10. Follow-up period distribution.

COMPLICATIONS

There were 121 (12.85%) reported complications, infection being the most common with a 7.27% incidence (69 cases). Of those 69 infections, 33 were superficial infections and 34 were deep infections. The 2 remaining cases did not specify the type of infection. After infection, the most common complication was prosthesis dislocation, with a 3.87% incidence (17/439 cases).

Thromboembolic complications (deep venous thrombosis and lung thromboembolism) were reported in 12 (2%) cases (Figure 11).

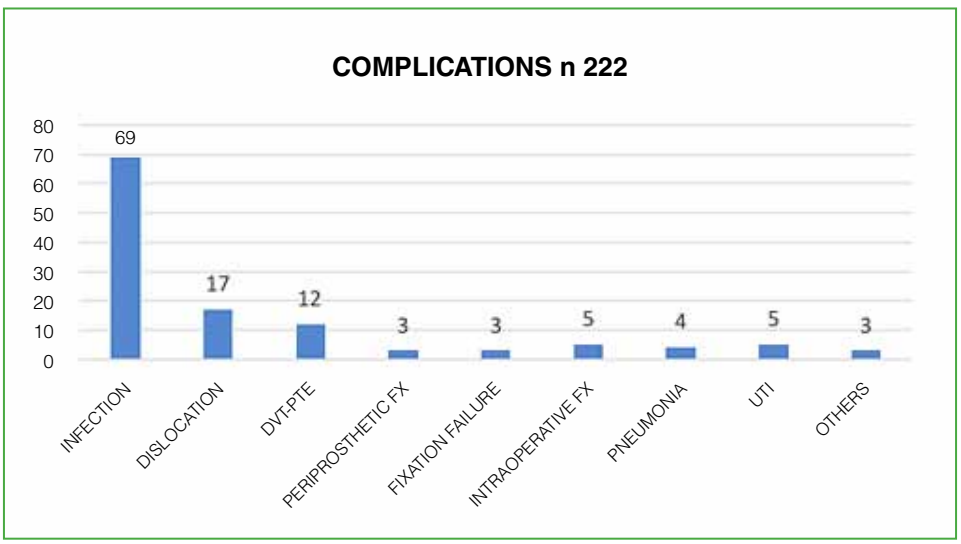

Figure 11. Distribution of recorded complications.

There were 5 intraoperative fractures (0.82%), 3 postoperative fractures (2 around the fixation and 1 periprosthetic fracture), and 3 cases of fixation loosening.

The remaining reported complications were: 5 urinary tract infections, 4 cases of pneumonia, 2 decompensated heart failures, and 1 lower-limb thrombophlebitis.

Revisions and reoperations

This item was completed in 608 answers, which reported 15 (2.46%) cases of revision surgeries. Eight cases specified the cause for revision: 3 cases of loosening or loss of fixation; 2 recurrent dislocations; 3 periprosthetic fractures. The remaining 7 revision cases did not specify the cause.

The single reported cause for reoperation was infection.

Mortality rate

The questionnaire had an item to specify the death of patient: mortality rate was 4.85% (36/741). The best possible scenario, considering cases where the item remained unanswered as still alive, would produce a 3.8% mortality rate (36/949).

It is worth noting that all dead patients had presented at least one complication of the ones previously mentioned.

CONCLUSIONS

This descriptive analysis allows for characterizing hip fractures in the Argentine population. This condition has a greater incidence in women (female-to-male ratio, 2.7:1). Approximately 80% of patients sustaining this type of injuries will be over 70 years at the time of injury and will present with multiple comorbidities (high-blood pressure, diabetes, osteoporosis, heart failure, anemia, etc.).

Two-thirds of patients will not live alone and approximately 60% will be able to walk indoors.

Current data show no clear difference between femoral neck fracture and intertrochanteric fracture incidence (47% vs 53%).

The postoperative complication rate was relatively high, approximately 13%, infection being the most common.

To conclude, the estimated mortality rate within the first months after surgery will range between 3.8% and 4.85%

We will continue with the analysis of the questionnaire answers in order to produce a second part with a statistical evaluation of the different types of treatment for each subtype of fracture, and the relationships between demographics and other patient characteristics, complications, and mortality.

Conflict of interests: Authors claim they do not have any conflict of interests.

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