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OUTCOME OF HIP FRACTURES AMONG ELDERLY SUBJECTS

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Summary This paper reports a retrospective study (1979-1995) on 200 patients (154 women and 46 men), 50-101 years old, who received medical attention because of unilateral hip fracture. Nine women and four men fractured twice. In 75% of women and 90% of men, surgery was carried out between one and five days after fracture. A non significant greater proportion of women (14/154) than men (6/46) died in the first year after injury (χ^2 = 3.459, P = 0.062). Survival was assessed using Cox proportional hazards model. Survival was a function of age (P = 0.000) and sex (P = 0.008). After adjustment to a common mean age (79 years), the median survivals for men and women were 3.9 and 8.4 years, respectively. Controlled concurrent life-threatening diseases, the kind of fracture [medial (subcapital and transcervical) or lateral (inter- and subtrochanteric)] and the type of prosthesis (total/partial articulation replacement) had no significant impact on survival. No differences in evolution were observed: 80% returned to their ambulatory status before injury, 8.5% required walking aids and 5.5% could not walk. The overall information afforded by this study suggests that with worldwide improvement of hip fracture outcome, the cost/effectiveness of surgical treatment of hip fracture may become, from the standpoint of public health investment, a favorable alternative with respect to cost/effectiveness of prevention-treatment measures.

Key words: hip fracture, survival, outcome

This paper reports a retrospective study of survival and reambulation of elderly subjects who underwent surgery due to hip fracture. It describes the experience of a single surgical team, employing the same techniques over a 16-year period.

A frequently quoted report[1] concluded that only 51% of hip fractured patients returned to preinjury ambulatory status, 27% died within a year of injury and 22% became non-ambulatory. This paper reports a more satisfactory outcome, also observed by other authors[2]. The general information obtained demonstrates that several crucial factors are completely independent of the repair of the fracture and instead, strongly dependent on prefracture conditions.

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Subjects and methods

From April 1979 to September 1995, 200 subjects (154 women and 46 men) aged 50 to 101 years old, residents of San Nicolas (Buenos Aires province) received medical attention because of unilateral hip fracture. Osteosynthesis, partial and total replacements (cemented) of the articulation were done in 7, 127 and 64 instances, respectively. Two patients (total replacement) had to be reope-rated. None of the patients required postoperative antithrombotic therapy. Only ten patients were residents of nursing homes.

Nine women and four men fractured twice. Three of these patients had their second fracture between six and twelve months after the first event, the ten remaining cases fractured between one and six years after the first fracture. In 75% of women and 90% of men, surgery was done between 1 and 5 days after fracture. Post-surgical controls and discharge were always carried out by the surgeon (J.C.).

Evolution. It was defined as "good" when the patient returned to prefracture ambulatory status, "unsatisfactory" when ambulation required assistance and "poor" when patients could not walk.

Statistical methods. As stated above, a fraction of the patients suffered a second fracture. These subjects were counted twice for their evolution. Survival was counted starting from their second fracture.

Survival was assessed using the Cox proportional hazards model. Covariates investigated were age, sex, the type of fracture (medial (subcapital and transcervical) or lateral (inter- and subtrochanteric)), type of prosthesis (total or partial articulation replacement) and existence (or not) of concurrent life-threatening diseases. The latter included severe heart-lung diseases, diabetes, hypertension, cancer and one case of massive GI hemorrhage. Chi square tests were employed to assess statistical significance in contingency tables. Analysis were carried out with the BMDP/PC statistical package, release 7.0.1. (BMDP Statistical Software, Cork, Ireland).

Results

Figure 1 displays the distributions of hip fractures as a function of age. The distributions were not significantly different ($\chi^2 = 3.80$, $P = 0.43$). The ratio females/males was close to 3/1. Mean (±SD) age at fracture was 79.3 ± 9.8 years and 78.7 ± 8.8 for women and men, respectively.

Evolution. No significant difference was observed between sexes. Evolution (both sexes added) was "good" in 162 cases (86.0%), "unsatisfactory" in fifteen (8%) and "poor" in eleven (6%) (Figure 2).

Survival. In the female group, fourteen women died within one year after surgery; eight were lost from follow-up. From the 46 men that suffered hip fractures nine died within one year after injury and five were lost in the follow up. In 35% of women and 55% of men cause of death was not recorded

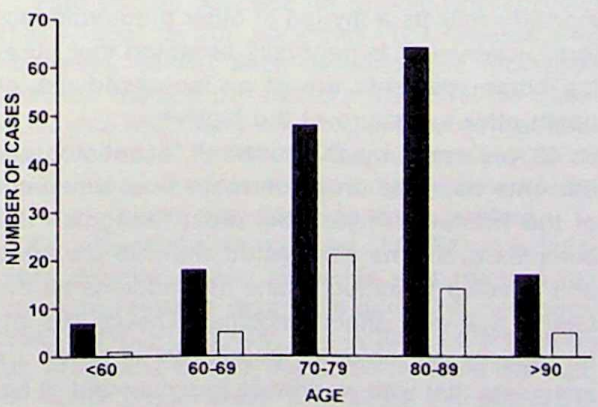

Fig. 1.– Distribution of hip fractured women (solid bars N = 148) and men (open bars, N = 40) as a function of their age.

Fig. 2.– Outcome of surgical repair of hip fracture of women (solid bars, N = 148) and men (open bars, N = 40).

and could not be established by inquiry to relatives. Mean survival time (±SEM) for women and men was 7.4 ± 0.5 and 5.8 ± 0.8 years ($P = 0.0019$, Breslow test).

The presence of concurrent life-threatening diseases as covariate of survival was disregarded because the proportion of women or men with concurrent life-threatening diseases that died [men: 14/24 (42%); women: 34/58 (42%)] did not differe from 50%, that would have occurred by chance (men: $\chi^2 = 0.375$, $P = 0.5473$; women: $\chi^2 = 1.39$, $P = 0.2410$).

Analysis of the data according to the Cox proportional hazards model, with age, sex, type of replacement (partial or total) and kind of fracture (lateral or medial) as covariates produced a glo-

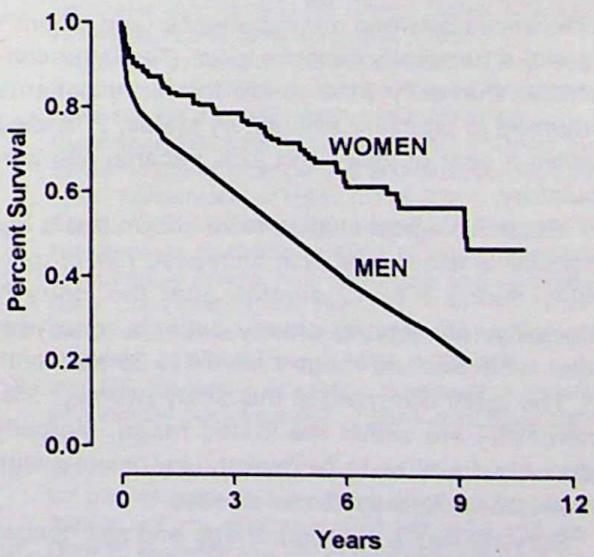

Fig. 3.– Age adjusted (theoretical) survival curves of hip fractured women (N = 154) and men (N = 46).

TABLE 1.– *-Survival as a function of age, sex, type of replacement (total or partial prosthesis) and type of fracture (lateral or medial).*

Variable	β Coefficient	Std. error	Score test χ^2	P
Age	0.0659	0.0140	30.71	0.000
Sex	-0.7062	0.2552	7.02	0.008
Type of prosthesis	0.3179	0.1488	1.97	0.160
Kind of fracture	–0.3776	0.2700	0.53	0.4662

bal χ^2 = 30.72, P = 0.0000. Table 1 displays the statistics of the covariates investigated.

Figure 3 displays the survival functions for males and females calculated after adjustment to a common mean age (79 years). The median survival times for women and men: 8.4 and 3.9 years after fracture, respectively, were significantly different (P = 0.008).

Discussion

Age-related fractures, specially hip fractures, are usually regarded as an enormous public health problem. This paper addresses the morbidity and mortality of hip fracture in a retrospective study on elderly subjects receiving medical attention in the city of San Nicolas, (Buenos Aires province). This investigation was prompted by the differences between our experience (and others[2, 5]) with a frequently quoted report[1]. The latter concluded that only 51% of hip fractured patients returned to preinjury ambulatory status, 27% died within a year of injury and 22% became non-ambulatory.

Epidemiological studies have shown that a hip fracture is associated with increased risk of mortality during 6 to 12 months after the injury[6-8]. Mortality rate among elderly patients, one year after a hip fracture range from 14 to 36 per cent[6-15]. The rates observed in this study (women: 9%, men:19%) are within the stated range. Mortality after hip fracture is frequently associated with poorly controlled systemic disease[12].

Survival was a function of age and sex (longer survival for females than for males). Several[1, 10, 13, 14] but not all studies[9, 16], have reported that after hip fracture, men have a higher mortality rate. Some reports have associated increased risk of death with advanced age[12, 17] and institutionalization [18]. The latter factor could not be investigated in the present series because only ten (5%) of the fractured persons were residents in nursing homes.

Evolution. The ability to go home after hospitalization for a fracture has become an increasingly important outcome measure. The proportion of patients who could return home were 95% in the present series. Literature reports range from 41 to 97 per cent[19-20]. The satisfactory protein intake of these patients may be invoked as a factor to explain their outcome, in agreement with some reports[21, 22].

Some studies have shown that efforts to shorten acute care hospitalization result in a substantial loss of independence[23, 24]. In the city of San Nicolás, nursing homes are few and installed recently. A community that cares for their elders favor their recovery of independence after hip fracture. The effect of the environment before the fracture –home or a hospital– on morbidity and mortality reflects a myriad of other premorbid factors. However, it is generally accepted that nursing home residents are at an increased risk of death after a fracture of the hip[25, 26].

As reviewed by Zuckerman[5] "a satisfactory outcome depends on much more than treatment of the fracture. Physicians must recognize the complex problems associated with hip fractures and develop treatment plans that address all the factors that may affect outcome". Though the latter seems an obvious comment, it made us speculate that with worldwide improvement of hip fracture outcome, the cost/effectiveness of surgical treatment of hip fracture may become a favorable alternative with respect to the cost/effec-

tiveness of prevention-treatment measures (determination of bone mineral density (BMD) and drug administration designed to increase that variable). The prevention-treatment measures are often based in the presumption that 70% of all fractures in persons aged 45 or over are due to osteoporosis[27]. However, according to a recent Danish study[28]: "The general effect from a general screening programme will be low and highly sensitive to compliance. As compliance with pharmaceutical treatment seems to be low, and as the effectiveness .... is encumbered with much uncertainty, prevention of osteoporosis through screening for low BMD should not be recommended at present". A similar conclusion is advanced by a meta-analysis of eleven separate study populations with about 90000 person years of observation time and over 2000 fractures[29]. A recent study[30] addressing the impact of underlying health status and the acute effects of the fracture on survival concludes that most of the increase in mortality following hip fracture is due to underlying conditions and probably would not be affected by reductions in the incidence of these fractures.

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Resumen

Evolución de las fracturas de cadera en ancianos

Este trabajo describe un estudio retrospectivo (1979-1995) de 200 pacientes (154 mujeres y 46 hombres), 50-101 años de edad, que recibieron atención médica por fractura unilateral de cadera. Nueve mujeres y cuatro hombres se fracturaron dos veces. El 75% de las mujeres y 90% de los hombres fue intervenido quirúrgicamente entre uno y cinco días después de la fractura.

La proporción de mujeres (11/154) que falleciera durante el año siguiente a la fractura fue significativamente más baja que la de los hombres (9/46) (χ^2 = 2,459, P = 0,062). La sobrevida fue analizada con la regresión múltiple de Cox, de riesgo proporcional a la edad. En este estudio la sobrevida fue función de la edad (P = 0,000) y el sexo (P = 0,008). Después de ajustar las dos poblaciones a la misma edad promedio (79 años), las medianas de las sobrevidas fueron 3,9 y 8,4 años para hombres y mujeres, respectivamente. Las enfermedades importantes, el tipo de fractura [medial (subcapital y transcervical) o lateral (inter- y subtrocantérica)] o el tipo de prótesis (reemplazo total o parcial de la articulación) no afectó significativamente la sobrevida.

No se observaron diferencias significativas asociadas al sexo en la evolución. Ochenta por ciento de los casos recuperó su aptitud ambulatoria pre-fractura, 8,5% requirió bastón y el 5,5% no volvió a caminar.

Los resultados obtenidos sugieren que con el generalizado mejoramiento de la cirugía y evolución de las fracturas de cadera, la relación costo/beneficio del tratamiento quirúrgico de las fracturas de cadera puede ser, desde el punto de vista de la inversión en salud, una alternativa más favorable que las medidas que combinan prevención con tratamiento.

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LA PORTADA

Ricardo Roux. **Algos.** Acrílico sobre tela; 1,90 x 2,00 m.
Primer Premio, Salón Anual Manuel Belgrano, 1987.
Cortesía del Museo de Artes Plásticas Eduardo Sívori,
Gobierno de la Ciudad de Buenos Aires