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Causes of Hip Fracture in the Elderly, Statistics (Literature Review)

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Abstract: Fractures of the neck and trochanteric regions of the femur, the major bone in the hip joint, are currently one of the most serious health care problems facing aging populations. Not only is the acute injury accompanied by severe hip pain, and an inability to stand or walk on the fractured leg, but there may be significant vascular damage to the femoral head ultimately leading to avascular necrosis and secondary osteoarthritis. Further, even after passive realignment of the femoral bone fragments, or surgery to replace the fragmented bone with a new femoral head and/or hip socket, poor healing, considerable functional disability, and a decreased capacity for managing activities of daily living independently may prevail, despite advances in anesthesia, nursing care, and surgical techniques. Because hip fractures are difficult to prevent without precise knowledge of the causative factors that underlie them, and their incidence is rising as the population ages, hip fractures pose a significant health care problem and source of morbidity and mortality for the aging populace. A better understanding of why hip fractures occur, and how treatment of these injuries can maximally restore function and prevent further injuries, in face of their rising incidence is a major challenge of considerable socioeconomic import and is the focus of the present article. However, this review will not deal with the pharmacological treatment of osteoporosis. For a review of this topic, the reader is referred to Crandall (2002), Lark and James (2002) and Mundy (2002).

Keywords: syndrome , treatment , diagnosis, treatment, views.

The English language literature published since the beginning of the 1980s describing the incidence of hip fractures in several countries has generally shown that while this is variable, with few exceptions, the age-adjusted incidence of this injury is increasing (Dargent and Breart, 1993, Lyons, 1997). In the United States, for example, the number of frail elderly at risk for hip fracture is expected to double in the next 15 years as the number of residents over age 85 years increases (Suzman, 1992). As well, even in the People's Republic of China where hip fracture rates have been amongst the lowest in the world compared with more affluent countries (Yan et al., 1999), hip fracture rates in Beijing were found to have increased by 34% for women and 33% for men between 1988 and 1992 (Xu et al., 1996). Similarly, in Finland, the whole population incidence rate approximately tripled between 1970 and 1991 with respect to both genders (Kannus et al., 1996), and the age-specific incidence of hip fractures increased in all age groups between 1970 and 1997 (Kannus et al., 1999). Likewise, linear increases of age-adjusted fracture incidences for men and women were found in The Netherlands over the period 1972–1987 (Boereboom et al., 1992) and in Sweden from 1966 to 1986 where the proportional increase was greatest in men and in city dwellers (Jarnlo, 1991).Indeed, as people live longer, the number of hip fractures in the world, estimated at 1.7 million in 1990 is expected to rise exponentially to 6.3 million by the year 2050 (Cooper et al., 1992). The increase in hip fracture incidence is expected to be seven-fold between the present time and 2050 in Belgium (Reginster et al., 2001), and will be greater in men, and in Asia where the highest absolute increment in the

elderly population will be observed (Gullberg et al., 1997, Melton, 1993). Highest incidences, however, are currently described for Northern Europe and North America (Johnell et al., 1992a, Melton, 1993), and in Australia, the number of hip fractures is expected to double over 29 years and quadruple in 56 years (Sanders et al., 1999).Of the nearly 300,000 hip fractures that occur each year in the United States (Apple and Hayes, 1994, Zuckerman, 1996), data by Michelson et al. (1995) suggests that 49% of these hip fractures will be intertrochanteric, 37% will be intracapsular, and 14% will be subtrochanteric; each have potentially different risk factor profiles, which have yet to be clearly delineated (see Fig. 1). Cummings et al. (1990) estimate that by the year 2040, a total of 512,000 hip fractures can be expected annually, but if the elderly populace in America grows more rapidly than predicted, the number of hip fractures in the year 2040 could be as high as 840,000 (Schneider and Guralnik, 1990). Contrasting these rates, if the number of trochanteric fractures per se increases relative to the number of femoral neck or intracapsular fractures, which is expected for males up to 2010 (Lofman et al., 2002), this may have direct public health implications since mortality, morbidity, and costs caused by these are higher than those of femoral neck fractures (Fox et al., 1999, Keene et al., 1993), as is disability (Michelson et al., 1995). This may be because intertrochanteric fracture patients are older with poorer health status (Fox et al., 1999), or because the mean age of women with trochanteric hip fractures seems to be rising (Martinez et al., 2001).Arguably, most of the published data pertaining to hip fracture prevalence projections are dated. This is because they do not take into account more recent interventions with drugs such as alendronate and risedronate, calcitonin, conjugated equine estrogens (CEEs), selective estrogen receptor modulators (SERMS), parathyroid hormone (PTH), statins and other experimental therapies that may prevent bone loss at the hip (Crandall, 2002, Lark and James, 2002), or data from developed countries that the age-specific incidence of hip fractures is flattening out or even static (Huusko et al., 1999, Lau et al., 1999). Nonetheless, given the anticipated growth of the older population, and that falls, which are difficult to prevent are implicated in most hip fractures, it is anticipated that the overall incidence of hip fractures will continue to rise by 1–3% per year in most areas of the world for both men and women (Cummings and Melton, 2002, Koeck et al., 2001, Lauritzen, 1997, McColl et al., 1998). In Greece, there was an 81% rise in hip fracture incidence between 1977 and 1992, an increase, which was greater than expected due to population aging, also suggested the existence of other factors influenced this increase (Paspati et al., 1998). Estimates of the risk for hip fractures, said to range from 10 to 17% in women at age 50 years, are about a third of these values in men (Lips, 1997). By the age of 90 years, one in four women and one in eight men will probably sustain a hip fracture (Armstrong and Wallace, 1994), although there may be a trend-break for New Zealand men and women (Fielden et al., 2001) and Swedish women due to current therapeutic and/or preventive measures (Lofman et al., 2002). The estimated lifetime risk of a hip fracture is said to be 15.6–17.5% in women, and 5.2–6.99% in men (Boonen et al., 1996), although in the Peoples Republic of China Shenyang Province and in Turkey, where men do heavy physical labor, the normal female/male ratio is found to be reversed (Lyritis, 1996, Yan et al., 1999). For very old women and men, there exists nearly the same risk of hip fracture in these countries (Lauritzen, 1997).Hip fracture rates among whites are said to be greater than those of nonwhite populations (Baron et al., 1996, Melton, 1996, Wolinsky and Fitzgerald, 1994) with a two to three times higher incidence in white than in nonwhite women (Zuckerman, 1996), although this gap seems to be narrowing (Lauderdale et al., 1997). Among nonwhites, the incidence is lower in Asian races than in black races, although the lowest incidence described has been that of the South African Black (Boereboom et al., 1992). In comparing Asians, however, it seems noteworthy that in Singapore where hip fracture rates are the highest in Asia, significant racial differences occur within the same community and time trends in hip fractures differ among the races. However, Koh et al. (2001) report that Kuwaiti nationals have higher hip fracture rates than those observed in other Asian countries, including Singapore. Rates among Kuwaiti females were also similar to those observed in some European countries and in Asian females in the United States. Rates in Kuwaiti males were high and equal to those of white males in the United States (Memon et al., 1998).To explore potential etiologic differences in the two

major types of hip fracture, Karagas et al. (1996) computed the incidence rates of fractures of the femoral neck and trochanteric region using a 5% sample of the United States Medicare population aged 65–99 years. For the period from 1 July 1986 to 30 June 1990, the rates of both hip fracture types increased with age in all race and gender categories. The proportion of hip fractures that occurred in the trochanteric region rose steeply with age among white women, but not among black women, white men, or black men. Within the United States, a north-to-south gradient in rates of both fracture types was observed among women, while no clear pattern was found for men. These findings raise the possibility of etiologic differences in the two fracture types, and provide further evidence of gender and racial differences in the risk of osteoporotic fractures.Yet, regardless of hip fracture subtype, ethnicity, gender and uncertainty about predicted incidence rates, hip fractures in the United States remain a major cause of excess mortality and substantial disability (Melton, 1993) and involve enormous medical and rehabilitation costs ranging from seven to ten billion dollars annually (Hayes et al., 1996). This estimated figure assumes no complications to the standard treatment and outcome of any individual hip fracture incident and no indirect costs of lost productivity for those still gainfully employed. It is, therefore, likely an underestimate of the true costs.Further, given that most hip fracture patients are elderly, report more signs of diseases than controls (Jarnlo, 1991), and suffer comorbidities that pose a high risk for complications, the direct costs of a hip fracture could be at least three-fold higher than those basic estimates previously mentioned (Holmberg and Thorngren, 1988). For example, while the excess mortality from a hip fracture is said to be between 10 and 20%, of those who survive, half will have longstanding disability (Meunier, 1997). As well, in addition to having an average stay of a total of 19–24 days of short-term hospital care which is almost double that for any other diagnosis (Baker, 1985, Dolk, 1989, Lyritis, 1996, Varney et al., 1992), length of hospital stay after a hip fracture may actually exceed 65 days as reported by Kitamura et al. (1998). Additionally, hip fracture patients are said to occupy 20–25% of all orthopedic beds, and this percentage could rise, given the increasing rate of the incidence of hip fractures (Lyritis, 1996). In addition, rehabilitation in this condition is slow, and of survivors only two-thirds will return home (Armstrong and Wallace, 1994), while 19–27% will require long-term institutional care (Chrischilles et al., 1991, Cumming et al., 1996).A second fracture, which may be in the same location with a tendency to greater displacement or instability occurs about six percent of the time and within a 4-year period postfracture (Dretakis et al., 1998). Further, Dolk (1989) predicts the frequency of sustaining two hip fractures over the course of an individual's lifetime could reach 20%. In addition, because new hip fractures may occur on the same side as well on the opposite side to an initial fracture, it may be possible to sustain three hip fractures over time. According to Schroder et al. (1993), the risk of incurring a third hip fracture per 1000 men is 8.6 and 9.8 per 1000 women, per year.Ipsilateral second hip fractures may include trochanteric fractures that are not operated on, or in the case of internally fixated hips, these may be attributable to suboptimal placing of the screw(s). Rarely, they may also occur after removal of internal fixation. In their study, Shroder et al. found 8% were ipsilateral, while 92% were contralateral, and that 62% of those with femoral neck fractures and 72% of those with trochanteric fractures had a preceding contralateral fracture of the same type. The mean time interval between the two fractures was 3.3 years (range 5 days–14 years); 20% occurred within 1 year, regardless of gender or fracture type. In calculating the risk of incurring a second hip fracture, the investigators found this rose about nine times over the risk of the first hip fracture for men, and six times for women with a first hip fracture. This increased risk of a second hip fracture was highly significant for both genders, but was significantly higher for men than for women.In the light of these findings, and the severe individual and economic consequences of hip fractures, as measured by their frequency, and influence on health care utilization, premature mortality, independence and life quality, there is currently an urgent need to prevent the anticipated rise in hip fracture incidence observed in most countries and especially to investigate the underlying causes of this condition.

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