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Determinants and Prognostic Factors in Fracture Neck of Femur Sequel to Osteoporosis in a South Western State of Nigeria

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Abstract: This prospective study of 31 adults with femoral neck fracture admitted into the National Orthopaedic Hospital Igbobi, Lagos. The study group comprised of 15 (75%) females and 5 males (25.0%) patients. The control group comprised of 10 (90.9%) males and 1 female (9.1%) patients. Femoral neck fracture in the study group was due to trivial domestic fall while in the control group it was due to road traffic accident and sports injury. All the patients in the control group were below 60 years while majority 19 (95.0%) of study group were above 70 years of age. All the 15 (100%) female patients in the study group were post menopausal while the only female in the control group was still in premenopausal stage. Nine (29.0%) of the 31 patients smoked cigarette-4 (12.9%) among the study group and 5 (16.1%) in the control. This is not statistically significant with a p-value of 0.135. Eleven (35.5%) of the 31 patients take alcohol; 6 (19.4%) among the study group and 5 (16.1%) in the control group, also this was not statistically significant (p value-0.390). None of the patients had thyroid dysfunction neoplastic condition or on treatment with steroids. All patients in the study group had cortical indices less than 0.5; while those of the control group were above 0.5. Hemiplegia following hypertension, Parkinsonism and visual impairment affect the outcome of treatment.

Key words: Fracture, femur, osteoporosis, prognostic factors, cortical index

INTRODUCTION

Fractures of the neck of the femur constitute a great challenge to Orthopeadic surgical practice because of unsatisfactory outcome of the fracture after treatment and this is a source of concern to the surgeon. With increasing life expectancy Nigeria is becoming more of a geriatric society with significant numbers of elderly being hospitalized as a result of problems from femoral neck fracture and the sequelae. Russel (1987) and Frost (1981) reported that the change in disease patterns and the greater longevity partly are partly responsible for the emergence of a group of skeletal "mass" abnormalities like osteoporosis which is important cause of morbidity and mortality.this disease condition is associated with and economic loss, detriments to the economic growth and productivity of individuals and the nation (Cohn *et al*., 1977).

Osteoporosis is an insidious, progressive disease with an accelerated loss of bone mass which leaves the skeleton weakened and more vulnerable to fracture i.e., bone failure. Osteoporosis combines an osteopenic skeleton with clinical disability resulting from a prolictivity to fracture and or bone pain with a causative underlying medical affection (Nilson, 1970; Pogrund *et al*., 1976) Osteoporosis is said to be uncommon in the black race (Bell *et al*., 1982) because of their greater initial bone mass and presently patients with the disease are on the increase in Nigeria. Keslety (1984) and Riggs and Melton (1986), reported annual estimates of 1.2 million fractures that are attributed to osteoporosis out of which 538,000 involve the vertebrae and 227,000 affect the hip. In osteoporosis related hip fractures, between 12 and 20% of the victims will die within one year and 50% of those who survived will need long term nursing care while only few will ever regain their pre-fracture ambulatory function (Cunning *et al*., 1985; Melton and Riggs, 1983).

Fractures related to osteoporosis have almost doubled in number in the last decade; one in every three women aged 50 years and above suffers a fracture caused by osteoporosis. The financial burden is enormous and it is estimated at 6.1 billion dollars each year in the U.S.A as reported by Holbrook *et al*. (1984). Therefore, it's a major health problem and challenge to developing countries

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especially Nigeria where over 60% of the population live in abject poverty. Hence, there is the need for increase public awareness on promotive and preventive measures and improve diagnostic facility for the clinicians. Osteoporosis is a major cause of femoral neck fractures in the elderly and due to the huge health and financial implications of this condition, the World Health Organization (WHO) chose osteoporosis as a major item to focus on in the bone and joint disease decades.

This study was conducted to identify factors that contribute to the development of osteoporosis in patients with femoral neck fractures and to determine factors that may contribute to the outcome of the injury.

MATERIALS AND METHODS

The study was carried out at the National Orthopaedic Hospital Igbobi Lagos. It is a specialized centre for management of Orthopaedic trauma, plastic and reconstructive surgery. It is a WHO collaborating centre for training and manpower development in Orthopaedics. Adult patients with femoral neck fracture presenting at the National Orthopaedic Hospital Igbobi, Lagos during a 12 month period were recruited. Ethical clearance was obtained from the ethical committee of the hospital to carryout the study and informed consent obtained from the patients before enlisting them for the research.

Consenting cases with femoral neck fracture from trivial trauma formed the study group while those with similar femoral neck fracture but due to high energy trauma formed the control group. In all, 31 consenting patients with femoral neck fracture who presented at the hospital over a period of 12 months were the studied population. Twenty of them fitted into the study group while 11 patients fitted into the control group. The 31 patients were followed up during which data were obtained.

A semi structured questionnaire was administered to each patient to obtain information on personal data, history of injury and past medical history. This was followed by thorough history taking and physical examination of these patients. Standard antero-posterior and lateral X-rays of the pelvis, affected femur and right hand of the patients were taken. X-ray of the right hand was used to determine the cortical index.

The fractures were then classified using Garden's classification (Russell, 1987) and the cortical index was measured using the right second metacarpal (Riggs and Melton, 1976). Regular ward rounds were done on all patients used in the study. All patients had preoperative and post operative physiotherapy. This study was constraints by absence of confirmatory diagnostic equipments for osteoporosis like photon absorptiometry and quantitative computed tomography which are not readily available in this environment.

RESULTS

The ages of patients in the study group ranged from 67-100 years with a mean age of 79.6±3.1 years. In the control group, the age range was 18 to 58 years and mean age of 33.7±2.3 years. Majority 11 (55%) of the patients in the study group were in the age group 70-79 years while most of the control cases 4 (36.4%) were in the 21-29 years age group (Table 1). In the study group 15 (75.0%) of the patients were females and 5 (25.0%) were males giving a female-male ratio of 3:1. In the control group 10 (90.9%) out of the 11 patients were males. All the 20 (100.0%) patients in the study group sustained femoral neck fracture resulting from domestic falls. In the control group 9 (81.8%) of the patients sustained fractures following Road Traffic Accident (RTA) while 2 (18.2%) resulted from sports injury.

The whole 15 female patients in the study group were post menopausal, while the only one female patient in the control group was still pre-menopausal. Nine (29.0%) of the 31 patients smoked cigarette-4 (12.9%) among the study group and 5 (16.1%) in the control. This is not statistically significant with a p-value of 0.135 (Table 2). Eleven (35.5%) of the 31 patients take alcohol; 6 (19.4%) among the study group and 5 (16.1%) in the control group, also this was not statistically significant (p-0.390). None of the patients had thyroid dysfunction neoplastic condition or on treatment with steroids. Less than one-fifth 4 (11.9%) of the total studied patients (both study and control) had visual impairment (Table 2). All the patients in the study group 20 (64.5%) have cortical indices less than 0.5, while those in the control group

Table 1a: Age distribution of cases

Age group (years)	Frequency (%)
60-69	1(5.0)
70-79	10(50.0)
80-89	7(35.0)
90-99	1(5.0)
100-109	1(5.0)
Total	20(100.0)

Table 1b: Age distribution of control

Age group (years)	Frequency (%)
<20	1(9.1)
20-29	4(36.4)
30-39	3(27.2)
40-49	2(18.2)
50-59	1(9.1)
Total	11(100.0)

Table 2a: Menopausal status of female patier

	Menopausal status		
Cases	Pre	Post	Total
Study	0	15	15
Control	1	00	01
Total	1	15	16

Table 2b: Smoking among the patients

	Menopausal status		
Cases	Pre	Post	Total
Study	4	16	20
Control	5	06	11
Total	9	22	31

Table 2c: Visual impairment among the patient

	Menopausal status		
Cases	Pre	Post	Total
Study	4	16	20
Control	0	11	11
Total	4	27	31

Table 3: Cortical index among the patients

	Cortical index		
Cases	<0.5	>0.5	Total
Study	20	00	20
Control	00	11	11
Total	20	11	31

have cortical indices above 0.5 (p = 0.00) (Table 3). Six months after surgery 5 patients (25.0%) of the study and 5 (45.5%) of the control group could walk unaided, while 14 (70.0%) of the study group and 5 (45.5%) of the control required walking aids like walking frame, crutches, walking stick etc.

Death can follow femoral neck fractures, as seen in this study where 1 patient each in the control (5%) and study group (9%) died postoperatively. The death in a patient in the control group was due to Disseminated Intravascular Coagulopathy, while septicemia was the cause of death in patient in the study group. The patients in the control group had open reduction and internal fixation with 130° angle blade plate. They were aged below 60 years. Majority did not have any disabling concomitant illness like hypertension, diabetes mellitus, Parkinson's disease etc. The patients had preoperative and post operative physiotherapy. These included breathing exercises, joints motion exercise and static muscular drills. The mobilization was also with the help of physiotherapists and this helped to reduce morbidity.

DISCUSSION

Over 75% of the patients in the study group were female and this is in line with the finding of Deles (1984) and Solomon *et al.* (2001) that reported high female preponderance. All the patients in the study group sustained injury following domestic fall implying inherent bony weakness while those in the control were due to road traffic accidents (81.8%) and sports (18.2%). Also, all the 15 (93.85%) female patients in the study group were post menopausal which points out the influence of estrogen in maintaining bone mass this is consistent with reports from other authors (Meema, 1984; Klebanski *et al.*, 1980; Eriksen *et al.*, 1985). Nineteen (95%) out of the patients in the study group were above 70 years which suggests senility may play a role in the development of osteoporosis. In contrast all the patients in the control group are below 60 years.

Alcohol and Smoking did not play a prominent role in the development of osteoporosis in this study. There as no significant difference observed among the study and control groups that smoke or take alcohol. This differs from the findings of Deles (1984) and Solomon *et al.* (2001). Thyroid swelling was absent in all the patients and none of them was on steroid or heparin for treatment. Neoplastic lesions were not found in any of the patients. About half of patients in the study group 11 (55.0%) had hypertension as against 2 (18.2%) in the control group. Among the hypertensives in the study group 5 (45.5) patients have suffered from cardiovascular accident from which they have made some recovery. The femoral neck fractures were also on the side of the hemiparesis in these patients. Only 1 (3.2%) patient had diabetes mellitus. Parkinson's disease was also found in 1 (3.2%) patient, 4 (12.9%) of all the patients had visual impairment (cataract at various stages).

Most of the fractures 23 (74.2%) were Garden's class IV All the patients in the study group 20 (64.5%) have cortical indices above 0.5; Cortical index below 0.5 implies osteoporosis. This means that all the patients in the study group suffer from osteoporosis. Therefore, it was not a surprise that they sustained femoral neck fracture following trivial domestic fall. The patients in the study group had hemi-arthroplasty using Austin Moore prosthesis. The reasons for this include their old age, most of them are above 70 years and so needed to be quickly mobilized to avoid the problems of prolonged immobilization like deep venous thrombosis and consequent pulmonary embolism, joints stiffness, bed sores, disuse atrophy of the limb muscles etc. Five (45%) of the patients have suffered cerebrovascular accidents resulting in hemiparesis; 4 (12.95) patients also had cataract of different stages of maturity resulting in visual impairment and only 1 (3.2%) patient had Parkinson's disease. Findings similar to these have been reported by Hinchey and Day (1960).

CONCLUSION

Osteoporosis is a major predisposing factor for fracture neck of femur among elderly patients. Menopause, female sex and old age were major predisposing factors for osteoporosis in Nigerian. Concomitant illnesses like hypertension cardiovascular accident; visual impairment and Parkinson's disease contribute to the outcome of treatment. There is a need to routinely screen Nigerians especially females for osteoporosis with a view to reducing the occurrence of femoral neck and other fractures among the elderly.

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