FIVE YEAR RETROSPECTIVE STUDY OF FEMORAL NECK FRACTURES
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INTRODUCTION
THIS retrospective study was carried out on patients admitted to the Fracture Unit of the Belfast City Hospital during the period 1965–1969 inclusive. It may be taken as a sequential study to that of Macafee 1969 who reported his findings on patients from the same unit over the preceding period. As in most centres the standard treatment for this type of fracture was by internal fixation using a tri-fin nail, blade-plate or by femoral head replacement. Pre-operative medical assessment and early mobilisation reduced mortality and decreased the duration of in-patient care.

METHODS
The case notes of all patients admitted with fractures of the femoral neck during the five year period, from 1st January 1965–31st December 1969 inclusive, were studied. The information was then transferred to data sheets for comparison. The nature of the fracture was confirmed radiologically in all cases.

RESULTS
During the period of study a total of 416 femoral neck fractures were recorded. Of these 72 were in male patients and 344 were in females. The distribution of patients by age and sex is shown in Table I. From this it can be seen that the number of fractures in males is fairly constant in each year, but that the incidence of fractures in females rose slowly from 1965 to 1968 and then more rapidly in the last year of the study.

| Year | 1965 | 1966 | 1967 | 1968 | 1969 | 1965–1969 |
|------|------|------|------|------|------|-----------|
| Male | 8    | 18   | 15   | 16   | 20   | 77        |
| Female | 58   | 56   | 65   | 63   | 97   | 339       |
| Total | 66   | 74   | 80   | 79   | 117  | 416       |

The distribution of cases in each year is displayed in Table II, and they are subdivided by the type of treatment received. Thus in this series it may be seen that
TABLE II

Distribution of cases per year and treatment

| Year | Conservative | Tri-fin nail | Blade plate | Austin Moore | Total |
|------|--------------|--------------|-------------|--------------|-------|
| 1965 | 0            | 13           | 14          | 39           | 66    |
| 1966 | 7            | 13           | 28          | 26           | 74    |
| 1967 | 4            | 11           | 23          | 42           | 80    |
| 1968 | 15           | 10           | 29          | 25           | 79    |
| 1969 | 12           | 17           | 36          | 52           | 117   |
| Total| 38           | 64           | 130         | 184          | 416   |

only a small proportion of these fractures were treated by conservative means, and that the most frequent treatment was by Austin Moore prosthetic replacement of the femoral head. Extra-capsular fractures were treated by the insertion of a blade plate and this was the second most common operation performed.

As expected there was no difference between the incidence of right and left sided fractures as has been reported in an earlier series by Mr. Macafee. The patients were divided into five year age groups, and the number of fractures in each group noted. The age-sex distribution is shown in Table III. Here it can be seen that there were fewer males admitted with hip fractures in any one age group. The maximum incidence for both sexes was seen to lie between 75 and 79 years of age. Below the age of 60 years the total incidence for each group was almost constant. There was a steep rise towards the maximum and then an equally steep decline after the age of 79 years.

TABLE III

| Age in years | Male | Female | Total |
|--------------|------|--------|-------|
| -50          | 5    | 8      | 13    |
| 50-54        | 3    | 8      | 11    |
| 55-59        | 3    | 11     | 14    |
| 60-64        | 6    | 18     | 24    |
| 65-69        | 8    | 33     | 41    |
| 70-74        | 8    | 58     | 66    |
| 75-79        | 13   | 82     | 95    |
| 80-84        | 15   | 62     | 77    |
| 85-89        | 11   | 39     | 50    |
| 90+          | 5    | 20     | 25    |
| Total        | 77   | 339    | 416   |
There were 248 intra-capsular fractures, which were treated by either tri-fin nail or by Austin Moore prosthetic replacement. Below the age of 55 years all were treated by the tri-fin nail, and between the ages of 55 and 65 years of age, almost 80 per cent were so treated. Over 70 years of age, almost 80 per cent were treated by femoral head replacement. Extra-capsular fractures, which were treated by nail plate fixation formed 30 per cent of all fractures at any age, with the exception of those over 90 and under 50 years of age, where the incidence was 48 per cent and 38 per cent respectively.

The number of patients in the survey was redistributed by type of treatment and by the age group, and pattern displayed in Table IV. It was the policy of the Unit that in the elderly operation was carried out whenever possible to allow for ease in nursing care. Intra-capsular fractures were treated in general by tri-fin nail fixation below the age of 70 and by Austin Moore replacement after that age. This pattern is clearly evident in the distribution of the cases as shown in Table IV. It should also be noted that the distribution throughout all age groups of extra-capsular fractures is relatively constant. Of those patients treated conservatively

| Age in years | Conservative | Tri-fin nail | Blade plate | Austin Moore | Total |
|--------------|--------------|--------------|-------------|--------------|-------|
| -50          | 3 (23.2)     | 5 (38.4)     | 5 (38.4)    | 0 (0.0)      | 13    |
| 50-54        | 2 (18.1)     | 6 (54.5)     | 3 (27.4)    | 0 (0.0)      | 11    |
| 55-59        | 0 (0.0)      | 8 (57.1)     | 4 (28.5)    | 2 (14.4)     | 14    |
| 60-64        | 3 (12.5)     | 10 (41.7)    | 8 (33.3)    | 3 (12.5)     | 24    |
| 65-69        | 2 (4.9)      | 10 (24.4)    | 13 (31.7)   | 16 (39.0)    | 41    |
| 70-74        | 4 (6.2)      | 10 (15.1)    | 16 (24.2)   | 36 (54.5)    | 66    |
| 75-79        | 9 (9.4)      | 7 (7.5)      | 25 (26.3)   | 54 (56.8)    | 95    |
| 80-84        | 6 (7.8)      | 2 (2.8)      | 27 (35.0)   | 42 (54.5)    | 77    |
| 85-89        | 7 (14.0)     | 4 (8.0)      | 17 (34.0)   | 22 (44.0)    | 50    |
| 90+          | 2 (8.0)      | 2 (8.0)      | 12 (48.0)   | 9 (36.0)     | 25    |
| Total        | 38 (9.3)     | 64 (15.3)    | 130 (31.2)  | 184 (44.2)   | 416   |

Number in brackets and italics = percentage.
cases underwent operation within the first four days, and the remaining 17.7 per cent suffered a delay of two weeks or longer while attempts were made to fully assess their medical state, and to render them fit for surgery.

The number of deaths during the studied period was noted and excluded from the calculation of duration of inpatient stay, which was then plotted with respect to the type of treatment received. This information together with the nature of patient rehabilitation is shown in Table V.

![Table V](image)

**Outcome in relation to the type of treatment received**

|         | Conservative | Tri-fin nail | Blade plate | Austin Moore | Total |
|---------|--------------|--------------|-------------|--------------|-------|
| Home    | 11 (35.5)    | 40 (69.0)    | 49 (40.2)   | 61 (42.1)    | 161 (45.2) |
| Convalescence | 6 (19.4) | 16 (27.6)    | 50 (41.0)   | 63 (43.4)    | 135 (37.9) |
| Dead    | 14 (45.2)    | 2 (3.4)      | 23 (18.8)   | 21 (14.5)    | 60 (16.9)  |
| Total   | 31           | 58           | 122         | 145          | 356    |

Number in brackets and italics = percentage.

The mean length of stay in the Fracture Unit of patients treated by Austin Moore replacement was 5.19 weeks compared to 6.93 and 7.38 weeks in the case of those treated by tri-fin nail and by blade plate. Conservatively treated cases had a mean duration of inpatient stay of 13.1 weeks. The mortality was 45.2 per cent in the latter group due to the poor general medical state. The insertion of a tri-fin nail carried the least risk with the mortality of 3.4 per cent compared to 18.8 per cent and 14.5 per cent in a case of the insertion of a blade plate or the Austin Moore prosthesis respectively.

The restoration of the patient to his normal environment after his treatment is a problem, especially when the patients are elderly. On leaving the Unit the patients were discharged directly home, transferred to another hospital or sent for convalescence, usually lasting two weeks. Those requiring long stay care were included in the convalescent group, as shown in Table V. Several cases were lost in the survey as a result of lack of data in their records. Sixty-nine per cent of those treated by tri-fin nail were discharged directly home, as compared to 40.2 per cent of those treated by blade plate insertion, and 42.1 per cent treated by Austin Moore prosthetic replacement. Of those patients treated surgically convalescence was least needed in those receiving the tri-fin nail.

**DISCUSSION**

This retrospective study was carried out over a five year period in one fracture unit, and during this period a total of 416 cases was treated. This is a marked increase when compared to the previous study in the same unit by Macafee (1969), which was over an eleven year period, and in this time he found 496 cases. His
survey covered the period from 1957, when the unit was first opened, to 1967. This gave a total of 341 cases in the eight years prior to the beginning of the current survey. This shows that there was an increase in the work load of the Unit of 95.3 per cent in comparison with the mean annual admissions in each survey.

As can be clearly seen from these results there was a marked increase in the number of female patients admitted each year, whereas the number of male patients has remained fairly constant. Female patients have formed the largest proportion of admissions in any year, and were the most frequent admission in any one age group. This may be due to the fact that there is an increase in the population of elderly patients due to better medical care, and also to an improved standard of living. There is a greater incidence of osteoporosis in the female after the menopause, and there is also a diminished male population over 60 years of age due to death from myocardial disease and other causes.

In this unit the policy is to treat patients surgically in order to reduce the length of inpatient care and ease the nursing problem. In addition this also results in an improved survival rate. Below the age of 70 years the tri-fin nail is the treatment of choice for intracapsular fractures, while in the over 70 year old group it is the Austin Moore prosthesis that is most frequently used. The latter usually allows the patient to sit out of bed the day following operation, and partial weight bearing can be commenced after the removal of sutures on the tenth post-operative day. This greatly increases the ease of nursing and encourages the patient by tangible evidence of early ambulation and the prospect of returning home to normal surroundings. The overall hospital mortality for all ages and types of treatment was 14.42 per cent as compared to 14.57 per cent as noted by Macafee in his survey. As in the previous study there was a degree of pre-selection in that the moribund patient was treated conservatively. However, all others were treated surgically when their medical condition allowed. The delay was usually three to four days as in 75 per cent of the cases studied. In previous surveys (Schenk, Smith and Stephens, 1956; Manpel, Marzulli and Boley, 1961; Neimann and Mankin, 1968) it has been recommended that a femoral neck fracture should be classed as an emergency and all patients treated as an urgent admission on the day of arrival. These authors, however, have a higher mortality following this treatment whereas in this series the hospital mortality was 3.4 per cent in the case of those treated by tri-fin nail and 14.5 per cent in those treated by femoral head replacement. The mortality in those treated by blade plate insertion was highest with a mortality of 18.8 per cent. One must also take into consideration the fact that those treated by the tri-fin nail were both younger and generally fitter than those treated by other means, and in the last group, 75 per cent of the patients were over 70 years of age, and the operation of insertion of a blade plate is of the longest duration of the three described. Only a few charts gave an index of operating time, but those which did, gave an average of 20 minutes to insert an Austin Moore prosthesis, 30 minutes for a tri-fin nail, and one hour for a blade plate. Neimann and Mankin (1968) stated that in their series of unselected hip fractures the mortality was 51.72 per cent. They also noted in a large series of surveys that for patients below the age of 70, the mean mortality was 9.6 per cent as compared to 5 per cent in
This survey. In the over 70 age group the mortality was 37 per cent compared to 26.29 per cent in this series. In considering all age groups and types of treatment, the mean was 20.03 per cent as compared to 14.4 per cent in this current series.

The earlier the patient can be mobilised and discharged the easier the nursing problem. There are many patients and their numbers are growing each year, while at the same time there is a decreasing availability of nursing staff. In some cases the patients were transferred to other hospitals, but were otherwise only discharged or sent for convalescence after they were able to walk safely with assistance. Rehabilitation was, therefore, carried out within the unit, and included in the period of inpatient care. The duration of inpatient care was found by Macafee (1969) to be on average of 8.1 weeks duration, and was confirmed in this study. This compares favourably with other series where the mean length of stay was 11.4 weeks. Rehabilitation to the patient's normal environment is notoriously a difficult problem as can be seen from this series, and 41 per cent of those treated by blade plate fixation required some degree of convalescence or long-term care. Forty-three per cent of the patients treated by Austin Moore prosthesis required convalescence or long-term care. Unfortunately, this type of operation has to be carried out in the over 70 years age group. They are quite frequently living alone or in poor home circumstances, and they require much post-operative care and re-education in walking. Many are unfit to be returned home or their relatives refuse to take them back. It has been calculated that at present 8 out of 10 patients in the female ward of the fracture unit are there for reasons totally unconcerned with their fracture or the treatment of same. A few have been waiting for six months or more for a long-stay bed elsewhere in one of the Geriatric Units.

This limited survey confirms the findings of Macafee (1969) and supports the view that surgical treatment of the elderly patient reduces the burden of nursing care, and that the replacement of the femoral head in the over 70 year old patient is advantageous with regard to low mortality and early discharge from the unit.

**Summary**

A retrospective survey of 416 patients admitted to the Belfast City Hospital with upper femoral fractures was carried out. This covered a five year period prior to 1970. In this series there was a four day pre-operative delay to allow for medical assessment and treatment. Femoral head replacement in the over 70 year old patient and tri-fin nail insertion in the under 70 age group was the policy of the unit as the treatment for intracapsular fractures. The hospital mortality was 26.29 per cent and 5 per cent above and below the age of 70 years respectively. The overall mortality was 14.4 per cent. The mean duration of inpatient care and rehabilitation was 8.4 weeks. The problems of increasing workload, decreasing availability of nursing staff and of patient discharge and return to their normal environment have been discussed.
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BOOK REVIEW

CLINICAL TESTS OF GASTRIC FUNCTION. By Alastair M. Connell. (Pp. 117. Illustrated. £1.50). London: Pitman Medical. 1973.

In recent years the well known gruel test meal has given place to more precise tests of gastric secretion, measurements of the rate of emptying have been introduced into clinical practice and it has become possible to measure the stimulating hormone, gastrin. The whole subject has been admirably reviewed in a small paper-back by Professor Alastair Connell, now of Cincinnati, Ohio. In this book he refers extensively to his experience of 1,800 tests in the gastric function service which he ran here in Belfast. Many of these patients were followed up over a period of years, so that the results of acid studies can be linked to the clinical findings, giving authority to Dr. Connell’s findings.

There is a particularly useful chapter describing postoperative tests, in which the controversial Hollander’s insulin test is carefully analyzed and its usefulness is put into perspective. In another chapter the gastric emptying test, devised in Belfast by George, is well described. An excellent feature of this work is a series of nine short appendices, each describing precisely how each test should be performed.

This low priced little book is a must for the gastroenterologist and should be available to all physicians and to any surgeon who is prepared to perform a vagotomy or gastrectomy. It is a great pleasure to recommend a book which is essentially a product of the Belfast Medical School, and which is eminently readable.

T.K.