A NOTE ON THE INCIDENCE OF DIABETES MELLITUS IN FRACTURES OF THE HIP*

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It had been the impression of members of the Department of Orthopedics at Yale that diabetes mellitus was found in cases of fractured femoral neck more frequently than in cases of intertrochanteric fractures of the femur. Should such an impression be borne out by fact, some significant feature of metabolism in relation to these fractures might be brought to light. It was speculated as to whether vascular disease, commonly associated with diabetes mellitus, might be involved in the localization of the fracture at the femoral neck. It was deemed advisable to review a series of 100 cases of each type of fracture of the hips (i.e., intracapsular and extracapsular) and to compare the incidence of diabetes mellitus in each series. It will be shown that diabetes mellitus occurs about as often in either type of fracture, and that the disease occurs in these fractures more often than the recorded incidence in the population as a whole.

Material studied and results

Fractures of the femoral neck: One hundred cases of fractures of the femoral neck were chosen consecutively from the records of the Orthopedic Service of the New Haven Hospital. The various races and nationalities represented by these patients were as follows: American, Irish, English, Scotch, Italian, Spanish, Jewish, Swedish, Polish, Danish, Finnish, German, French, Czechoslovakian, and Negro. Therefore the series was well balanced in this respect. The average age of these 100 patients was 65 years. Seventy-five per cent of the patients were women. Of this series of patients suffering from a fractured femoral neck, four (i.e., 4 per cent) were called diabetics by the medical consultants. Table 1 lists the fasting blood sugar determinations and the extent of the glycosuria of these four diabetics.

In addition to the four cases listed in the table upon which a positive diagnosis of diabetes mellitus had been made clinically, there were eleven upon which routine fasting blood sugar determinations had been made. None of these latter cases revealed glycosuria.

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Table 1
**diabetics**

| Fracture of the femoral neck | Fasting blood sugar mg.% | Glycosuria |
|-----------------------------|--------------------------|------------|
| Case                        |                          |            |
| 1                           | 172                      | ++++       |
| 2                           | 161                      | +++        |
| 3                           | 277                      | +++        |
| 4                           | 132                      | +++        |

Table 2 lists the findings, which show an average value of 93 mg.% for the fasting blood sugar.

Table 2
**non-diabetics**

| Fracture of the femoral neck | Fasting blood sugar mg.% |
|------------------------------|--------------------------|
| Case                        |                          |
| 1                           | 130                      |
| 2                           | 99                       |
| 3                           | 96                       |
| 4                           | 93                       |
| 5                           | 76                       |
| 6                           | 68                       |
| 7                           | 100                      |
| 8                           | 107                      |
| 9                           | 93                       |
| 10                          | 78                       |
| 11                          | 84                       |

**Average** 93

**Intertrochanteric fracture of the femur.** One hundred consecutive cases of intertrochanteric fractures were reviewed from the records of the Orthopedic Service of the New Haven Hospital. The races and nationalities represented were: American, Canadian, Irish, English, Scotch, Swedish, Danish, Finnish, Russian, German, Swiss, Italian, Jewish, French, Greek, and Syrian. Therefore, in respect to racial material the series of intertrochanteric fractures was quite comparable with the series of intracapsular fractures. The average age for the 100 patients with extracapsular fractures was 74 years.
As was to be expected, this latter fracture occurred in an age group on the average about ten years older than those with fractured femoral necks. Sixty-eight per cent were women. Hence in both series women were predominantly affected. There was a clinical diagnosis by the medical consultants of diabetes mellitus in five cases (i.e., 5 per cent), an incidence not significantly different from that found in the cases of fracture of the femoral neck. Table 3 lists the values of the fasting blood sugar in three of the five diabetics.

**Table 3**

| Intertrochanteric fractures | Fasting blood sugar | Glycosuria |
|-----------------------------|---------------------|------------|
| Case                        | mg.%                |            |
|                             | 180                 | . . . .     |
|                             | 209                 | +++       |
|                             | .................. | +++       |
|                             | 280                 | +++       |

Fasting blood sugar determinations were carried out on twelve additional cases as a routine procedure. None of these twelve cases showed glycosuria. Table 4 lists the values obtained, revealing an average of 88 mg.% (compare with Table 2).

**Table 4**

| Intertrochanteric fractures | Blood sugar |
|-----------------------------|-------------|
| Case                        | mg.%        |
|                             | 85          |
|                             | 91          |
|                             | 100         |
|                             | 97          |
|                             | 96          |
|                             | 71          |
|                             | 96          |
|                             | 97          |
|                             | 77          |
|                             | 79          |
|                             | 91          |
|                             | 80          |

Average 88
Table 5 presents the race, sex, and age of the diabetics with fracture of the femoral neck.

| Race    | Sex  | Age     |
|---------|------|---------|
| Jewish  | Female | 74 years |
| Irish   | Female | 74 years |
| Irish   | Male   | 64 years |
| Irish   | Female | 72 years |
|         | Average age | 71 years |

Table 6 reveals the race, sex, and age of the diabetics with intertrochanteric fractures.

| Race     | Sex  | Age     |
|----------|------|---------|
| Unknown  | Female | 80 years |
| Irish    | Female | 64 years |
| German   | Female | 69 years |
| English  | Male   | 71 years |
| Swedish  | Female | 65 years |
|          | Average age | 69.8 years |

Comment

The incidence of diabetes mellitus in a series of 100 cases of fractured femoral neck was found to be 4 per cent, while the incidence of the disease in a series of 100 cases of intertrochanteric fractures was 5 per cent. The impression that the disease is found more commonly in intracapsular than in extracapsular fractures is erroneous, at least in the above series. It is of interest to compare the incidence of diabetes mellitus found in the total number of cases studied with the frequency of the disease in the population as a whole. It is known that diabetes increases in incidence with age, that it is more common in women than in men, and that it is found especially commonly in Irish and Jewish patients.

Joslin presented material adopted from the National Health Survey, from which it is gathered that one diabetic out of every 225
males is found in the age group of 45-54 years. One diabetic in every 125 females is found in the age group of 45-54 years. The ratio is 1 for 100 in men and 1 for 50 in women in the age group of 55-64 years. For 65 years and over it is expected that one out of 70 men will be a diabetic and that one out of every 45 women will be a diabetic.

Thus it can be seen that for the entire 200 cases of fractures of the hip the incidence of diabetes mellitus (4.5 per cent) is more than twice the incidence at present reported. It must be borne in mind that a fracture may aggravate an existing diabetes mellitus and perhaps may cause to become manifest a latent condition of diabetes. Dr. John Peters² has expressed the opinion that an incidence of 4 to 5 per cent is neither surprising nor significant when consideration is given to the facts that in the above series women predominated, that the age group was between 65 and 74 years, and that a major fracture was incurred.

References
1 Joslin, E. P.: J. Am. Med. Asso., 1940, 115, 2033-38.
2 Peters, J. P.: Personal communication.