THE INCIDENCE OF OSTEOCHONDRITIS DISSECANS

BY

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The purpose of this paper is to establish the incidence of osteochondritis dissecans in the age group in which it is known to occur most commonly. In the services, the majority of men are aged 18-30 years and thereby constitute this age group. The total number of men reporting sick, whose signs and symptoms required a radiograph of a particular joint, were taken as the index for comparison. Four joints were considered, namely the elbow, knee, ankle and hip. The total number of such men covered by this report was 18,405, of whom 427 suffered from osteochondritis dissecans, i.e., 2.3 per cent. This paper is an analysis of these 427 cases which were seen over an eight-year period at one military hospital.

Review of the literature

The literature on osteochondritis dissecans was reviewed very fully by Mensor & Melody (1941), whose work dealt mainly with the occurrence of this disease in the ankle joint. Ray & Coughlin (1947) reviewed the literature from 1941 onwards and added a further 14 cases of osteochondritis dissecans occurring in the ankle joint. They discussed the aetiology and concluded that trauma was the primary cause.

Kleinberg (1949) reported a case of bilateral osteochondritis dissecans of the patella. Hay (1950) reported two cases in whom several joints were affected and came to the conclusion that neither injury, congenital anomaly nor constitutional disturbance played any part in the aetiology of this disease. Simpson (1950) recorded a further case occurring in the ankle joint. Roberts & Hughes (1950) published an extensive review of the whole subject and quoted one case with several joints involved. With reference to aetiology, they concluded that both a constitutional factor and a local factor played a part. Van Demark (1952) recorded a series of cases in children where spontaneous healing occurred through revascularization of the separated fragment. Marks (1952) reported a case in which a flake fracture was said to have progressed to osteochondritis dissecans.

Green & Banks (1953) discussed the incidence of osteochondritis dissecans in children between the ages of 4 to 15 years, the natural history of the disease and their results of treatment. They also noted the fairly high incidence of other types of osteochondritis in the cases which they treated. Coltart (1952) and Nisbet (1954) described a dome fracture of the talus and regard this as a different entity from osteochondritis dissecans.
Fig. 1. O.D. Head of radius.

Fig. 2. O.D. of patella.
Fig. 3. O.D. Right hip.

Fig. 4. O.D. Head of 2nd metatarsal.
The etiology and diagnosis of osteochondritis dissecans

This disease has been attributed to one or more etiologies. Ray & Coughlin (1947) thought that trauma was the underlying factor, yet others, such as Nisbet (1954), look upon the result of trauma as a fracture and not as osteochondritis dissecans. In soldiers a history of some type of trauma can be obtained in practically every case, ranging from stamping of feet on the parade ground to major injuries such as are experienced in time of war, and therefore such a history cannot be interpreted as being necessarily the etiology of the disease.

The diagnosis of osteochondritis dissecans is made on the radiographic appearances, and hence in establishing the incidence of this syndrome it has to be taken into account that the interpretation of the radiographs plays a large part in the number of cases diagnosed.

When considering the natural history of the disease, as described by Green & Banks (1953), it is to be noted that in early cases the only change to be seen is one of localized subchondral decalcification which in a certain number of cases progresses no farther and recalcification takes place. If this is taken as the criterion for the diagnosis of osteochondritis dissecans, then the incidence is far greater than if only the formation of a separate fragment is recognized as a necessary finding before the diagnosis is made. We have accepted, for the diagnosis, evidence ranging from definite localized subchondral decalcification to a chondral or osteochondral loose body or an osteochondral defect in the bone.

The incidence of osteochondritis dissecans in the elbow

Table 1 shows that the incidence of the disease is greater in the right elbow than in the left, which is a similar finding to that of Roberts & Hughes (1950). In determining the actual site of the osteochondritic bed some considerable difficulty may be found due to the secondary changes taking place in the part of the joint opposite to the lesion. The capitellum appears flattened when it is the site of an osteochondritic lesion, whereas in Fig. 1 the deformity is similar, but due to a lesion in the head of the radius, which has also produced the typical enlargement of the head.

From Table 2 it can be seen that the incidence of osteochondritis dissecans in the elbow is 3.6 per cent. The total number of cases comprises all those cases whose clinical signs and symptoms required a radiograph of the elbow joint.

The incidence of osteochondritis dissecans in the knee

The findings of previous authors are confirmed in that the incidence in the medial femoral condyle is, on an average, three times that of the lateral femoral condyle, there being no significant difference between right and left. This is shown in Table 3. Osteochondritis dissecans of the patella (Fig. 2) was seen in only seven cases. In eight cases a femoral condyle in both knee joints was affected (Fig. 5).

Flattening of the medial femoral condyle, similar to that of the capitellum, is seen in the antero-posterior view of the radiograph (Fig. 5) and should arouse suspicion of an osteochondritic lesion. A notch view may be required to demonstrate the site.
The incidence of osteochondritis dissecans in the knee joint is 4 per cent. when the total number of cases in comparison is taken as all those having clinical signs and symptoms which required a radiograph of the joint (Table 4).

The incidence of osteochondritis dissecans in the ankle

In assessing the incidence of osteochondritis dissecans in the ankle joint no distinction between this diagnosis and that of dome fracture of the talus was made. It is interesting to note that, in the vast majority of cases in this series, the lesion occurred on the supero-medial articular angle of the talus, which is a similar finding to that of Ray & Coughlin (1947), whereas the cases described by Nisbet (1954) as fractures all occurred on the supero-lateral angle (Fig. 6, Table 5).

The incidence of osteochondritis dissecans of the ankle joint is 0.5 per cent. of those patients whose signs and symptoms required radiography of the ankle (Table 6).

Table 1. Analysis of incidence of osteochondritis dissecans in the elbow joint, 1947-1954.

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
<th>Bilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>33</td>
<td>51</td>
<td>1</td>
</tr>
<tr>
<td>Humerus</td>
<td>16</td>
<td>22</td>
<td>1</td>
</tr>
<tr>
<td>Radius</td>
<td>4</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Incidence of osteochondritis dissecans relative to the total number of cases seen, 1947-1954, in the elbow joint.

<table>
<thead>
<tr>
<th>Number of joints affected by O.D.</th>
<th>Total number of cases</th>
<th>Percentage of O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>86</td>
<td>2,383</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Table 3. Analysis of incidence of osteochondritis dissecans in the knee joint, 1947-1954.

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
<th>Bilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>143</td>
<td>148</td>
<td>8</td>
</tr>
<tr>
<td>Femoral Condyles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medial</td>
<td>73</td>
<td>70</td>
<td>5</td>
</tr>
<tr>
<td>Lateral</td>
<td>19</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Patella</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Incidence of osteochondritis dissecans relative to the total number of cases seen, 1947-1954, in the knee joint.

<table>
<thead>
<tr>
<th>Number of joints affected by O.D.</th>
<th>Total number of cases</th>
<th>Percentage of O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>297</td>
<td>7,280</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 5. Analysis of incidence of osteochondritis dissecans in the ankle joint, 1947-1954.

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
<th>Bilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>14</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Supero-medial</td>
<td>7</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Supero-lateral</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Incidence of osteochondritis dissecans relative to the total number of cases seen, 1947-1954, in the ankle joint.

<table>
<thead>
<tr>
<th>Number of joints affected by O.D.</th>
<th>Total number of cases</th>
<th>Percentage of O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>7,039</td>
<td>0.5</td>
</tr>
</tbody>
</table>
Fig. 5. O.D. Medial femoral condyle with flattening seen in A.P. bilateral.

Fig. 6. O.D. Supero-lateral angle articular surface body of talus.

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Fig. 7. O.D. Left hip. Clinically irritable hip. January, 1954.

Fig. 8. O.D. Left hip. Clinically irritable hip again. October, 1954.

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
<th>Bilateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>5</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 8. Incidence of osteochondritis dissecans relative to the total number of cases seen, 1947-1954, in the hip joint.

<table>
<thead>
<tr>
<th>Number of joints affected by O.D.</th>
<th>Total number of cases</th>
<th>Percentage of O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>1,703</td>
<td>0.5</td>
</tr>
</tbody>
</table>

The incidence of osteochondritis dissecans in the hip

The hip is the most interesting joint in which the syndrome of osteochondritis dissecans occurs, as it is the only joint where another type of osteochondritis is seen in the same anatomical position, namely osteochondritis juvenalis.

Osteochondritis juvenalis commences in the majority of cases between the ages of 5 to 10 years; it is, therefore, noteworthy that Green & Banks (1953), who reviewed this age group, found no case of osteochondritis dissecans, whereas in the present series, in which an age group of 18 to 30 years is reviewed, there were nine instances of this disease occurring in the hip joint (Fig. 3). It is of great interest that the disease in the hip joint was bilateral in three of the six patients, which is a far greater incidence of bilateral disease than in any other joint (Table 7).

The incidence of osteochondritis dissecans in the hip was 0.5 per cent. when calculated in a similar manner to that described for the elbow (Table 8).

The incidence of osteochondritis dissecans in other joints

The occurrence of osteochondritis dissecans in the shoulder joint is mentioned in the literature, but no cases were seen during the eight-year period under review.

It is possible that osteochondritis of the head of the second metatarsal is part of the syndrome of osteochondritis dissecans, as frequently a typical loose body is found. Unfortunately, the records are insufficient to include this joint in the present series. Fig. 4 shows such a case with loose body formation. The changes in the contour of the metatarsal head and the base of the proximal phalanx are regarded as secondary in nature, similar to the secondary changes in the bones noted in both the elbow and knee joints.

The clinical signs and symptoms and their treatment

The cardinal symptom of which the patients with osteochondritis dissecans complained was pain, and secondly, the effects of irritation of the joint, such as synovial effusion and instability. In both the elbow and knee joints locking episodes are common, and in these joints arthrotomy for removal of the loose body will relieve this symptom, but the pain and instability tend to be unaffected.

In the ankle joint, on the other hand, because of the mechanical structure of this joint, the separated fragment usually remains in the osteochondritic bed and so locking incidents do not occur. The main symptom, that of pain, is greatly relieved by removal of the loose body.
In the hip joint, painful limitation of movement in all directions (i.e., an irritable hip) was the presenting symptom in each case. Only one patient complained of instability and none had experienced locking. In all cases treatment has been entirely palliative.

If the osteochondritic lesion does not heal by recalcification or in more advanced cases by revascularization with maintenance of the normal contour of the affected bone, then in the course of time a mechanical osteoarthritis of the joint is set up.

Case report on osteochondritis dissecans of the elbow

W. W., aged 21, male, presented with inability to extend the right elbow for the past two weeks. He had had no injury that he could remember. The limitation of extension was due both to pain and to a mechanical block. During the two-week period he had had one day during which the elbow had returned to a normal range of painless movement.

On examination, flexion of elbow was limited to 80 degrees and extension to 160 degrees. He was tender over the head of the radius. Radiography revealed a loose body.

At arthrotomy a cartilagenous loose body, the size of a pea, was removed and the convex edge of the head of the radius was noted to be eroded, but not so deeply as to reveal the underlying bone.

Five weeks after operation flexion of the elbow was full while extension was limited by 10 degrees. All movements were pain free.

Case report on osteochondritis dissecans of both knees

W. K. B., aged 20, male, presented with symptoms of recurrent effusion and painful instability of both knees, the right being worse than the left. He had had multiple locking episodes, but there was no definite history of unlocking. Radiographs revealed osteochondritis dissecans of both medial femoral condyles (Fig. 5).

He had an arthrotomy of the right knee in September, 1953, when his medial meniscus was found to be torn and was excised. The osteochondritic bed was scraped out. A similar procedure was carried out on the left knee one week later. The post-operative period was uneventful and he became symptom free.

He remained symptom free till the commencement of severe army training a year later, when pain and effusions into both knee joints recurred. There was, however, no recurrence of locking or instability. His symptoms failed to respond to three months of intensive physiotherapy and it was necessary to invalid him out of the army.

Case report on osteochondritis dissecans of the ankle

H. J. C., aged 23, male, when jumping off an obstacle on an assault course in July, 1953, had an inversion plantar flexion injury to his left ankle. This was followed by marked oedema of the whole ankle with bruising and tenderness over the anterior and posterior talo-fibular ligaments. Radiography revealed a
Fig. 9. O.D. Hip. Bilateral.

Fig. 10. O.D. Hip. Bilateral. Lateral views.

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lesion of the body of the talus towards the supero-lateral articular angle which was diagnosed as an osteochondritis dissecans (Fig. 6).

He was immobilized in a below-knee non-weight-bearing plaster of paris for three months, followed by six weeks in a walking plaster of paris, but despite this, pain persisted and he remained tender over the antero-lateral aspect of his ankle.

Arthrotomy of his left ankle in November, 1953, revealed a loose body still lying the right way up in its osteochondritic bed and not upside down as Nisbet (1954) described it in dome fractures. The loose body was removed and the bed was scraped out.

Following operation the ankle was mobilized at once, and within one month of operation he had full ankle movements and was walking without a limp. The pain had been entirely relieved. He had remained symptom free when reviewed one month later.

Case reports on osteochondritis dissecans of the hip

Case 1.—J. C., aged 22, male, complained of a gradual onset of pain in the left groin which caused him to limp. This pain, which had been persistent, became more severe in January, 1954. Examination revealed limitation of all movements of the left hip by pain. Radiography of both hips showed no abnormality (Fig. 7). He was immobilized in a double hip spica for six weeks.

On removal of the plaster of paris his radiographs were still said to show no abnormality, and the E.S.R. was normal. He was treated with physiotherapy and became symptom-free, and fit for duty in June, 1954.

Pain and limitation of movements in the left hip recurred in October, 1954, and radiographs then revealed osteochondritis dissecans of the left femoral head (Fig. 8).

He is at present being treated in a Charnley weight-relieving caliper, with improvement of his symptoms.

Case 2.—D. M., aged 18 male, had an injury to his left leg at the age of 14 years. The mechanism of injury was a rotational force on the extended leg. A month following this, pain commenced in the left hip.

Since that time he has had intermittent pain in the left hip. He also complains of instability in the left leg. There have been no locking incidents. Radiographs reveal a well-marked osteochondritis dissecans, with loose body formation on the left and an early osteochondritic lesion on the right (Figs. 9 and 10).

He had had no symptoms in any other joints and a complete radiographic survey showed no other abnormality.

On examination of his left leg he was found to have wasting and diminished tone of the gluteal and quadriceps muscle groups, with a positive Trendelenburg list, and painful limitation of all hip movements.

His symptoms on this occasion had been brought on by the increased activity of basic training in the army. Following admission to hospital and restricted activity he became symptom-free, though there was no change in the physical signs.
The Incidence of Osteochondritis Dissecans

SUMMARY

1. The literature on osteochondritis dissecans is reviewed.

2. The incidence of the disease in service patients whose signs and symptoms required a radiograph of elbow, knee, ankle or hip joints, over an eight-year period, is recorded. This was 3.6 per cent. in the elbow and knee and 0.5 per cent. in the ankle and hip joints, the age group being 18 to 30 years.

3. The diagnostic radiological features of the disease are described.

4. The role of operative treatment in this disease is discussed.

5. A representative case history in each group is recorded.

We wish to thank the Commanding Officer, Cambridge Military Hospital, for making the records available to us, and the Radiologist, Cambridge Military Hospital, for his help and advice.

REFERENCES