OSTEOCHONDRITIS DISSECANS

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This thesis is based on a study of three hundred consecutive arthrotomies performed at Deer Lodge Hospital from July 1944 to February 1948.

OSTEOCHONDRITIS DISSECANS

INTRODUCTORY

In a survey of three hundred consecutive arthrotomies performed at Deer Lodge Hospital from July, 1944 to February, 1948 it was found that fifty were done for the removal of loose bodies. Of these fifty cases twenty-four can be classified as Osteochondritis Dissecans. This term may be defined as a non-infectious process involving the articular and subchondral areas of joint surfaces resulting in a separation of a portion of the articular surface including underlying bone with eventual formation of one or more loose bodies.

HISTORICAL

The name "Osteochondritis Dissecans" was first used by Konig who in 1887, according to Burr,(1) had described the condition as follows: "Without any injury, there separate from the joint ends fragments of varying size, in consequence of a process as yet unexplained; their bony surface becomes covered with a dense connective tissue containing cartilage cells here and there. In the same manner the defect in the bone becomes covered over. In some cases a smaller body composed entirely of bone, and smooth, with the appearance of necrotic bone, lay under a larger piece perhaps 2 cm. in diameter. These pieces often fitted almost exactly in the

corresponding bone defect, seeming at times somewhat too large because the pits in the bone had become filled in. Aside from this, together with a fluid effusion and slight villous hypertrophy, these joints looked perfectly sound and they remained so after the removal of the loose bodies."

Numerous articles have been written describing the etiology of the condition. This falls chiefly into two classes:

(a) Traumatic

(b) Non-traumatic

One of the most thorough was that by A. J. Timbrell Fisher (5), who classified loose bodies in joints as follows:

"Group I - occurring associated with more or less general pathological processes,

e.g. - Tabes - Tbc. - Osteo Arthritis

Group II - Loose bodies in otherwise normal joints.

(a) having microscopic appearance of detached portions of the articular surfaces.

(b) from the inter-articular fibro cartilages.

(c) from detached epiphysis - not portion of articulating area.

Group III - Types of synovial chondromata."

Fisher noted in his article that the first reference in surgical literature to loose bodies was in the works of Ambroise Paré. "This great French surgeon, in the year 1558, successfully removed a loose body or stone from the knee. We read that the stone was of the size of an almond, very white,

hard, and polished." Alexander Monro, in 1738 was the first to recognize that loose bodies might be derived from the articular ends of the bones. Since that time various theories as to the source of formation of loose bodies have been brought forward.

Timbrell Fisher believed that trauma was the chief factor in the formation of the osteochondritic body. In a summary of thirteen cases he points out that twelve gave a history of either direct trauma, or of secondary trauma, such as the pull of the attachment of the cruciate ligament.

Another exponent of the theory of trauma as an etiological factor in the formation of Osteochondritis Dissecans was H. A. T. Fairbank,(4) His conclusions were summarised as follows:

"1. It most frequently occurs in adolescents and young adults indulging in vigorous pastimes.

2. Typical lesions are seen in radiograms and revealed by operation after definite trauma, which in some cases is quite recent.

3. A lesion at the typical site may involve the cartilage only, the detached fragment consisting of normal articular cartilage. In such cases there is a definite history of trauma.

4. There is an entire absence of any inflammatory changes, macroscopic and microscopic, in or about the lesions.

5. The naked-eye appearances, when operation is performed early, suggest nothing but a simple recent fracture. When sufficient time has elapsed for changes to occur, they are only those which we should expect as the result of an effort on the part of the tissues to repair the damage. Precisely similar changes are occasionally found on the more exposed parts of the femoral articular surface, when the traumatic origin of the lesions is never disputed.

6. When the detached fragment is suspended by a vascular pedicle the bone in it is not dead, and is not a sequestrum, so why should it have been exfoliated?

7. To explain the occurrence of the lesion in both knees, or in the knees of more than one member of a family, it is easier to accept the presence of anatomical peculiarities which favour exceptional local trauma than the suggestion of embolism, damage to blood-supply, or indeed any other theory."

Donald King (9) in a clinical study of this condition in twenty-four cases came to the following conclusions: males - usually in the second decade, were most commonly affected. When involving the knee, the condition is bilateral in 20% of cases. Presence of loose bodies in knee or elbow without any obvious source suggest this condition. Good results may be expected after radical operation. Unusually long-standing cases

are not likely to be benefitted. He reported two cases of this condition occurring in the hip; and summarized twenty-five other cases previously reported in the literature occurring at this site.

Wagner & Cohn (17) - carefully abstracted the literature on this subject from three hundred and sixty-five articles. They mentioned the following authors who believed trauma to be the chief factor in the etiology of Osteochondritis Dissecans.

In the 18th Century - Monro, Riemer and Haller; in the 19th Century - Rainey, Broadhurst, Poncet and Burghard. In the early part of the 20th Century a mechanical basis was stressed by Boerner, Codman and Rimann. Axhausen concluded that an important etiological factor was interference with the blood supply resulting in what he termed "bland mycotic embolic necrosis."

Kappis pointed out the action of congenital forces: "to explain the traumatic origin in the absence of serious injury he assumed a predisposition as the result of disease or congenital disturbance of the articular cartilage."

John Hunter, Koch, Humphrey and Halstead, were among several others listed by Wagner and Cohn who believed that non-traumatic factors were the basis for this condition.

The authors gave reports of five of their own cases, and concluded that heredity operates as an etiological factor in the occurrence of Osteochondritis Dissecans.

Milton J. Geyman, (6) - gave a short resume regarding the various opinions as to the etiology of this condition. Among the several articles he abstracted it is interesting to note

the opinion of Barth who felt "that the pull of ligaments at their insertion was a common cause of the condition." Another interesting theory he discussed was that of Freiberg who believed "that the occurrence of a long tubercle on the mesial tibial spine in a position of flexion and external rotation of the tibia or the femur results in a localized trauma to an arteriole in the mesial femoral condyle." Geyman also stressed the presence of atypical sites.

Francis Conway (3), after reviewing various theories, came to the conclusion that "the most logical explanation seems to be that it allows for a preliminary trauma between non-sensitive articular surface and subsequent injury to a functional repair. Following the vessel damage and thrombosis, a localized area of necrosis results with sequestration of a fragment from the articular surface."

Hermanson (7) described three cases of bilateral Osteochondritis Dissecans of the Knee - as noted by Donald King the usual group is that of young adolescence.

The youngest case described in the literature was reported by Theodore B. Strange (16) - as occurring in a child four-and-half years of age. In addition he referred to five other cases previously reported, under the age of twelve.

Robert G. Hutchinson (8) - described several atypical cases and reported the condition in such rare sites as, phalanx of toe, and metacarpal bone.

Carrell and Childress[2] - described the condition in a woman of 38, involving the 1st metatarsal head.

Paul E. McMaster and Ralph T. Lewin[12] - illustrated a case occurring in the carpal scaphoid.

Recently H. S. Morton and W. E. Crysler[13] - have reported several cases which they termed Osteochondritis Dissecans of the supratrochlear Septum of the humerus. Since their publication similar cases have been reported by Lerner, et al.[11] It has also been shown that the condition is not uncommon bilaterally.

D. B. Phemister[14] - in a review of previous literature concerning the etiological factor of this condition, and as a result of his own experimental work, came to the conclusion that "an entirely satisfactory explanation had not yet been offered."

A summary of the cases in consecutive order is listed in the accompanying Table No. I. Reports outlining the main features of each case have been compiled.

To illustrate the various features of this condition, the following cases from this series are presented in detail. The remainder of the case reports, are appended to the thesis.

TABLE NO. I

SUMMARY OF CASES

Case	Date Reported	Date Discharged from observation	Age	Sex	Joint	Disability: Subjective	Disability: Objective	Duration of symptoms	Previous Trauma	Operation	Location of site of fragments	Result: anatomical	Result: functional	Result: economical
1. DFH	March 22/45	June 15/45	32	M.	Rt. Elbow	Occasional locking dull ache	Extension limited 10° Flexion by 5° Supination & Pronation 10°	6 yrs	Yes	Arthrotomy	Capitellum	90%	90%	100%
2. SR	March 27/45	June 22/45	24	M.	Rt. Knee	Weakness & Swelling	Extension to 109° Flexion only to 90°	18 mos.	Yes	Arthrotomy Removal of loose bodies	Medial femoral Condyle Articular surface Patella	100%	100%	100%
3. LAT	April 17/45	Sept. 5/46	25	M.	Lt. Knee	Swelling & stiffness	Nil	3 yrs	Yes	Arthrotomy Removal of detached fragments	Posterior Aspect Medial femoral Condyle	100%	100%	100%
4. WK	Aug. 29/45	Jan. 15/46	39	M.	Rt. Elbow	Pain & locking	Lacks extension	5 yrs	No	Arthrotomy Removal of loose bodies	Supratrochlear Septum of Humerus	100%	100%	75%
5 DAY	Nov. 30/45	April 9/45	23	M.	Rt. Knee	Stabbing pain. One	Lax anterior Cruciate ligaments & $\frac{3}{4}$" wasting of calf	7 mos.	Yes	Arthrotomy Removal of detached fragments	Lateral aspect of medial femoral Condyle	100%	100%	75%
6 MSK	Jan. 1/46	Dec. 19/46	24	M.	Lt. Knee	Aching	Nil	$1\frac{1}{2}$ yrs	Yes	Arthrotomy. Removal of detached fragments	Lateral aspect of medial femoral Condyle	100%	100%	100%
7 WAM	Jan. 14/46	Mar. 22/46	29	M.	Rt. Knee	Locking & swelling of Rt. Knee	Nil	3 yrs	Yes	Arthrotomy Removal of loose body	Posterior aspect Medial femoral Condyle	90%	100%	100%

8 LAH	Feb. 22/46	April 15/46	23	M.	Lt. Knee	Pain Swelling	Nil	4 yrs	Yes	Arthro-tomy Removal of loose body	Arti-cular sur-face of Patella	100%	100%	100%
9 GEO E	Feb. 22/46	June 5/46	23	M.	Lt. Knee	Swelling Aching	Nil	2 yrs	Yes	Arthro-tomy Removal of frag-ment	Medial femoral Condyle	100%	90%	90%
10 BP	Feb. 25/46	April 30/46	26	M.	Lt. Knee	Ache Insecu-rity (Knee gives way)	Limi-tation 10° Flexion 5° ex-tension	2 yrs	No	Arthro-tomy Removal of frag-ments	Medial femoral Condyle	90%	100%	100%
11 JH	Feb. 26/46	April 30/46	21	M.	Rt. Knee	Pain locking & swel-ling	Nil	1½ yrs	Yes	Arthro-tomy Removal of de-tached fragment	Medial femoral Condyle	90%	100%	90%
12 SB	Mar. 5/46	June 11/46	26	M.	Rt. Shoul-der	Recur-rent dislo-cation	Nil	11 yrs	Yes	Arthro-tomy Removal of loose body & Bankart repair	Glenoid rim	70%	70%	60%

TABLE I (CONT'D.) SUMMARY OF CASES

Case	Date Reported	Date Discharged from observation	Age	Sex	Joint	Disability: Subjective	Disability: Objective	Duration of	Previous Trauma	Operation	Location of site of fragments	Result: anatomical	Result: functional	Result: economical
13 HND	Mar. 22/46	June 26/46	19	M.	Lt. Knee	Pain restriction of movement	20% limitation of flexion	1 wk.	Yes	Arthrotomy Removal of fragment	Lateral femoral Condyle	100%	100%	100%
14 AM	Apr. 1/46	July 11/46	31	M.	Lt. Elbow	Pain & stiffness	10% limitation of flexion	4 yrs	Yes	Arthrotomy Removal of loose bodies	Capitellum	90%	90%	90%
15 WLS	Apr. 25/46	June 30/46	24	M.	Rt. Elbow	Soreness locking & swelling	Limitation of flexion by 30° & extension by 80°	1 yr.	No	Arthrotomy Removal of loose bodies	Supratrochlear septum of humerus	90%	90%	90%
16 DJ	Apr. 26/46	June 20/46	24	M.	Rt. Knee	Locking & Swelling	Nil	5 Mos.	Yes	Arthrotomy Removal of loose bodies	Medial femoral Condyle	100%	100%	100%
17 ELK	June 17/46	Aug. 12/46	20	M.	Rt. Ankle	Pain after Prolonged walking	Nil	3 yrs	Yes	Arthrotomy Removal of detached fragment	Superior Articular surface of talus	100%	100%	100%
18 AWD	Sept. 19/46	Nov. 14/46	29	M.	Lt. Knee	Swelling Feeling of insecurity	30° Limitation of extension	1 month	Yes	Arthrotomy Removal of loose bodies	Lateral femoral Condyle	90%	100%	100%
19 HE	Nov. 26/46	Mar. 5/47	21	M.	Lt. Ankle	Pain & Swelling	Negative	2 yrs	Yes Para. chute jump	Arthrotomy Removal of loose bodies	Superior area of talus	100%	100%	100%

20 LK	Dec. 30/46	Feb. 7/47	21	M.	Rt. Elbow	Aching Swelling & stiffness	Flexion present to 90° & extension to 120°	10 yrs	No	Arthrotomy Removal of loose bodies	Supratrochlear of septum	90%	90%	100%
21 WM	Dec. 4/46	Feb. 6/47	22	M.	Lt. Elbow	Locking pain & stiffness	Flexion limited 20° Extension 5°	2 yrs	No	Arthrotomy Removal of detached fragment	Supratrochlear Septum of Humerus	90%	90%	90%
22 TRM	Apr. 10/47	Aug. 11/47	32	M.	Lt. knee	Very frequent locking	Negative	2 yrs	Yes	Arthrotomy Removal of detached fragments	Medial femoral Condyle & Patella	80%	80%	100%
23 WEF	May 18/47	July 31/47	31	M.	Rt. Elbow	Aching Weakness Clicks	Power of extension reduced	6 mos	Nil	Arthrotomy	Capitellum	80%	80%	75%
24 RH	Jan. 14/48	Mar. 22/48	19	M.	Lt. Knee	Pain at intervals	Flexion restricted by 20° Extension by 3° $\frac{1}{2}$" atrophy of thigh	$2\frac{1}{2}$ yrs	Yes	Arthrotomy Removal of detached fragment	Medial femoral Condyle	90%	90%	90%
25 ED	Sept. 17/46	Feb. 4/47	15	F	Both knees	Pain & swelling	Slight swelling	Since childhood	Fall	Arthrotomy Removal of detached fragments	Lateral femoral Condyle	100%	100%	100%

CASE NO. 24

Illustrating the classical site in the knee joint.

R. H., a trainman 19 years of age, reported to the hospital January 14, 1948. The patient stated that his knee joint troubled him intermittently for the past two and a half years, in that his knee had ached and felt stiff. He felt that his condition had been aggravated by a fall from a hammock in January, 1947, Although his knee joint was quite painful for two or three days it did not swell or lock at that time, nor subsequently. Pain would be particularly aggravated by running.

Examination showed his general physical condition to be good. The left knee was slightly swollen and there was $\frac{1}{2}$" atrophy of the thigh and of the calf. Flexion was restricted by 20° and extension lacked the last 5° of movement. There was no apparent laxity of the collateral or cruciate ligaments. Deep pressure elicited slight tenderness over the medial femoral condyle posteriorly.

X-ray films of the left knee revealed an area of Osteochondritis Dissecans on the lateral aspect of the medial femoral condyle. (Fig. 24-A).

Anthrotomy was performed on February 7, 1948, the joint being opened by means of a medial para-patellar incision. The patella was displaced. A defect $1\frac{1}{4}$" by $\frac{3}{4}$" was noted on the lateral aspect of the medial femoral condyle. (Fig. 24-B). This loose fragment was separated by sharp dissection and the defect curetted. (Fig. 24-C). The wound was closed in layers. The loose fragment was sectioned (Fig. 24-D).

The pathologist reported a typical picture of Osteochondritis Dissecans (Fig. 24-E).

Case No. 24

Fig. 24 (a)

Antero-posterior and lateral views of lt. knee. The typical lesion is seen demarcated in the medial femoral Condyle.

Case No. 24

Fig. 24 (b)

Area of Osteochondritis Dissecans seen at operation.

Case No. 24

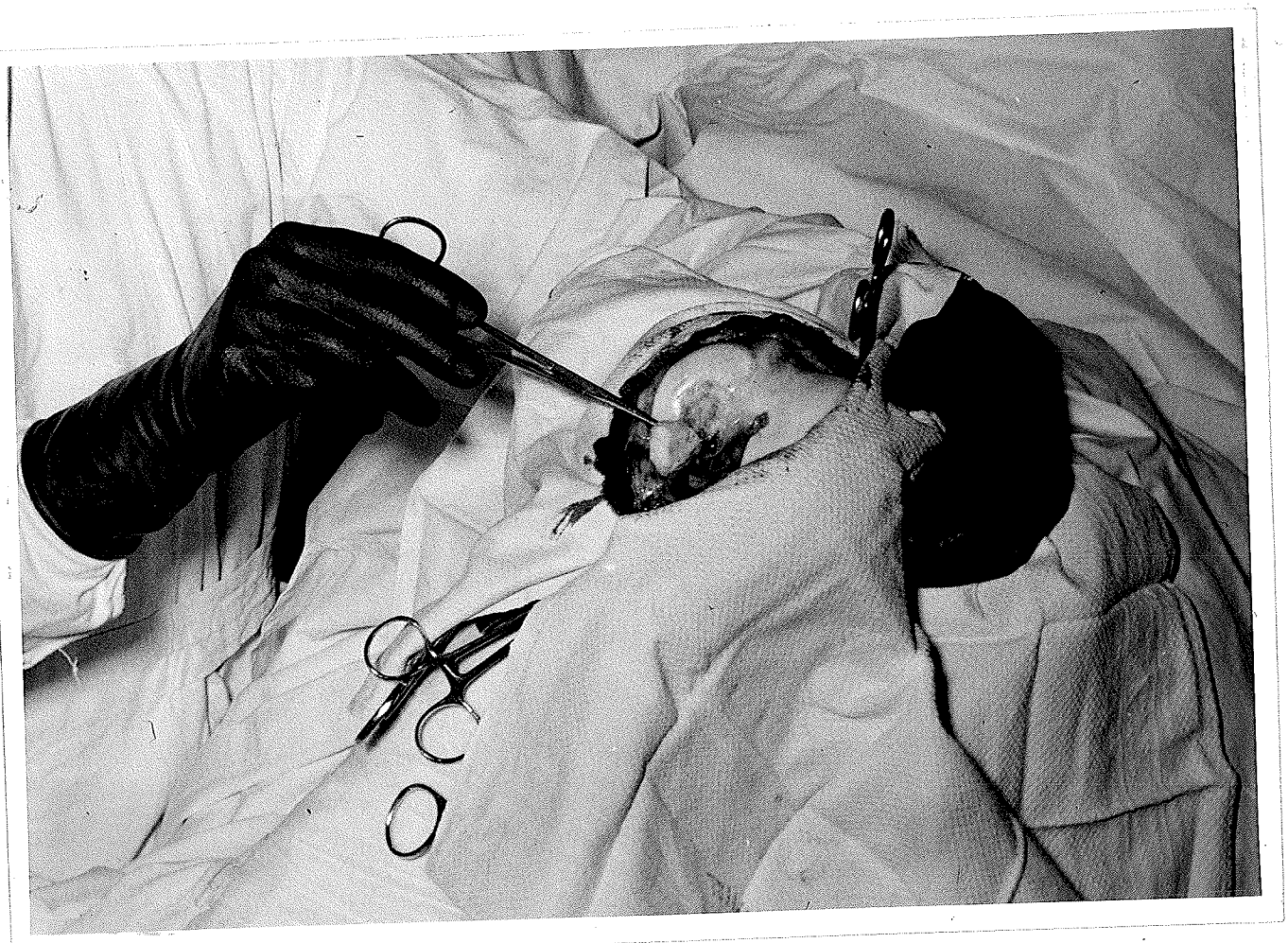

Fig. 24 (c)

Loose fragment being pried from its bed

Case No. 24

Fig. 24 (d)

Revealing articular and deep surface of loose fragment.

Case No. 24

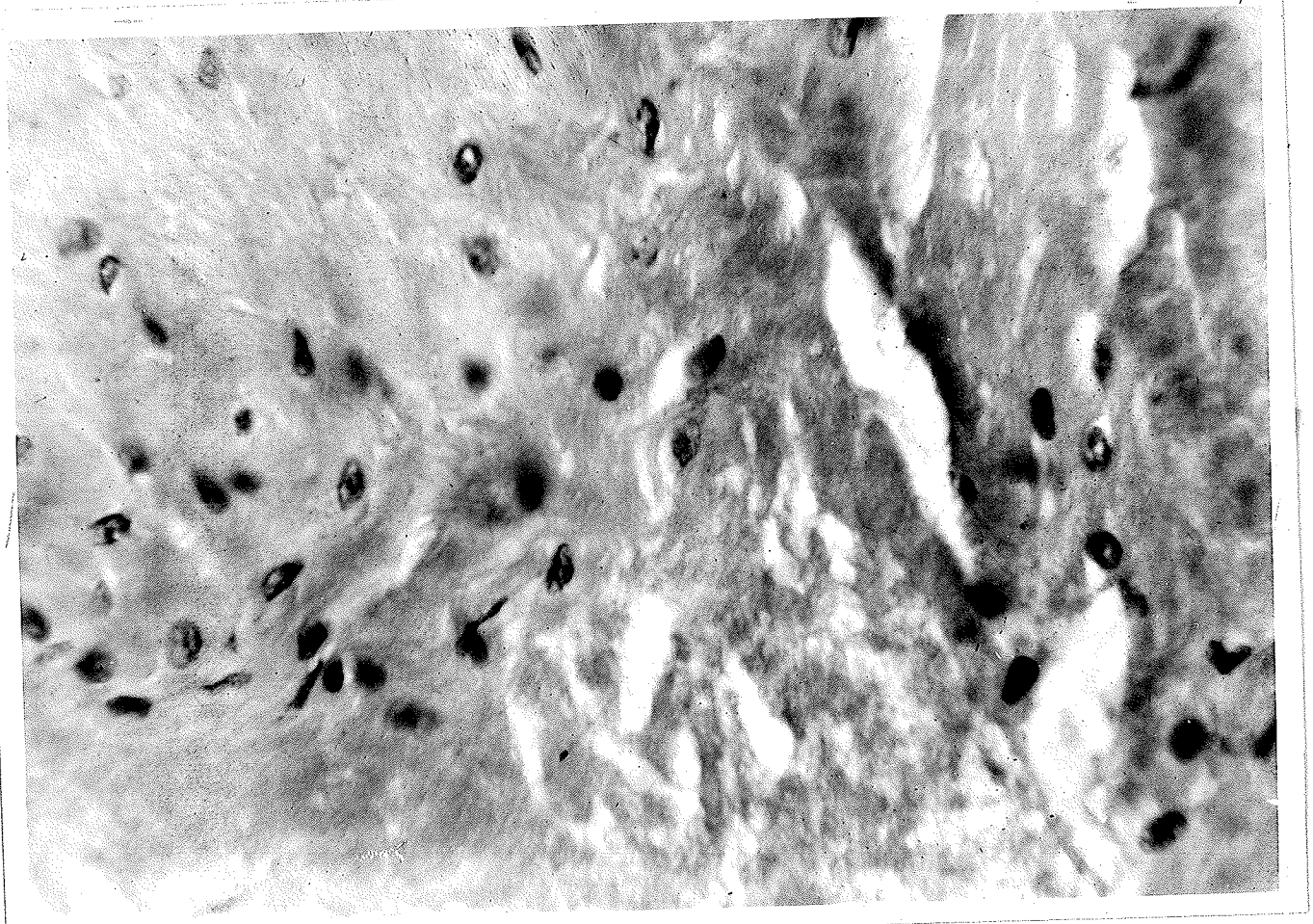

Fig. 24(e)

Photomicrograph revealing typical picture of necrosis and degeneration of cartilage.

A progress X-ray film taken revealed that the loose fragment had now been removed (Fig. 24-F).

March 19, 1948 Patient had made good progress. Flexion was present well past 90°. Extension was complete. It was considered that he had made a satisfactory recovery and would be fit for work in another month.

Case No. 24

Fig. 24 (f)

Antero-posterior and lateral views of lt. knee post-operatively. The loose fragment has been removed.

CASE NO. 6

Further illustrating classical site encountered in the knee.

M. S. K., aged 24 years, a carpenter by trade, reported January 14, 1946. He gave a history of having sustained a shrapnel wound to the lateral aspect of his left knee on September, 1944. This wound however, had not involved either the bone or the joint proper. He claimed that since his injury he has had aching in his left knee during damp weather and after prolonged walking. There was no history of any locking or swelling.

X-rays revealed an area of Osteochondritis Dissecans of the medial femoral condyle. (Fig. 6-A)

On January 16, 1946, when he was first operated on, no line of demarcation could be made out. The menisci were intact. No further lesion was seen. He made an uneventful recovery from his operation. He reported again on July 16, 1946, stating that he had tried to carry on with his work, but that certain activities, such as prolonged standing would cause an aching in his knee. On examining his knee the operative incision was found to be well healed. The small shrapnel wound was neither adherent nor tender. Active movements of extension and flexion were complete. There was no evidence of any laxness of the cruciate or collateral ligaments, nor wasting of the the thigh or calf muscles.

X-ray films more clearly outlined the area of Osteochondritis Dissecans previously seen. (Fig. 6-B) He was advised to wait several months before further operation in order to allow the fragment to become more completely separated.

On the 3rd November, 1946, a second operation was performed. The affected portion of bone on the lateral surface of the medial femoral condyle was found to be demarcated although still firmly adherent deeply.

Case No. 6

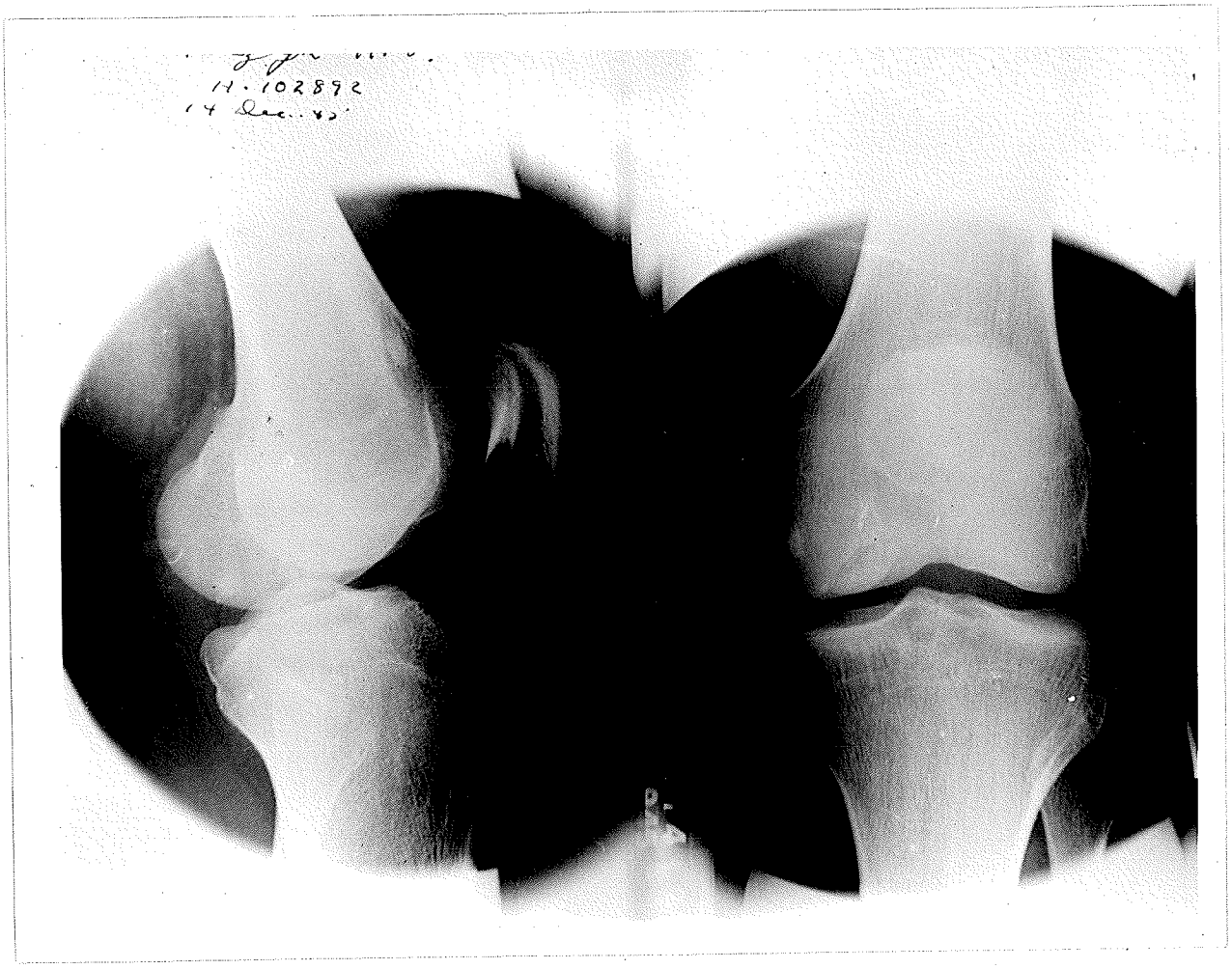

Fig. 6 (a)

Antero-posterior and lateral views of lt. knee Dec. 14, 1945 revealing outline of lesions in medial femoral Condyle.

Case No. 6

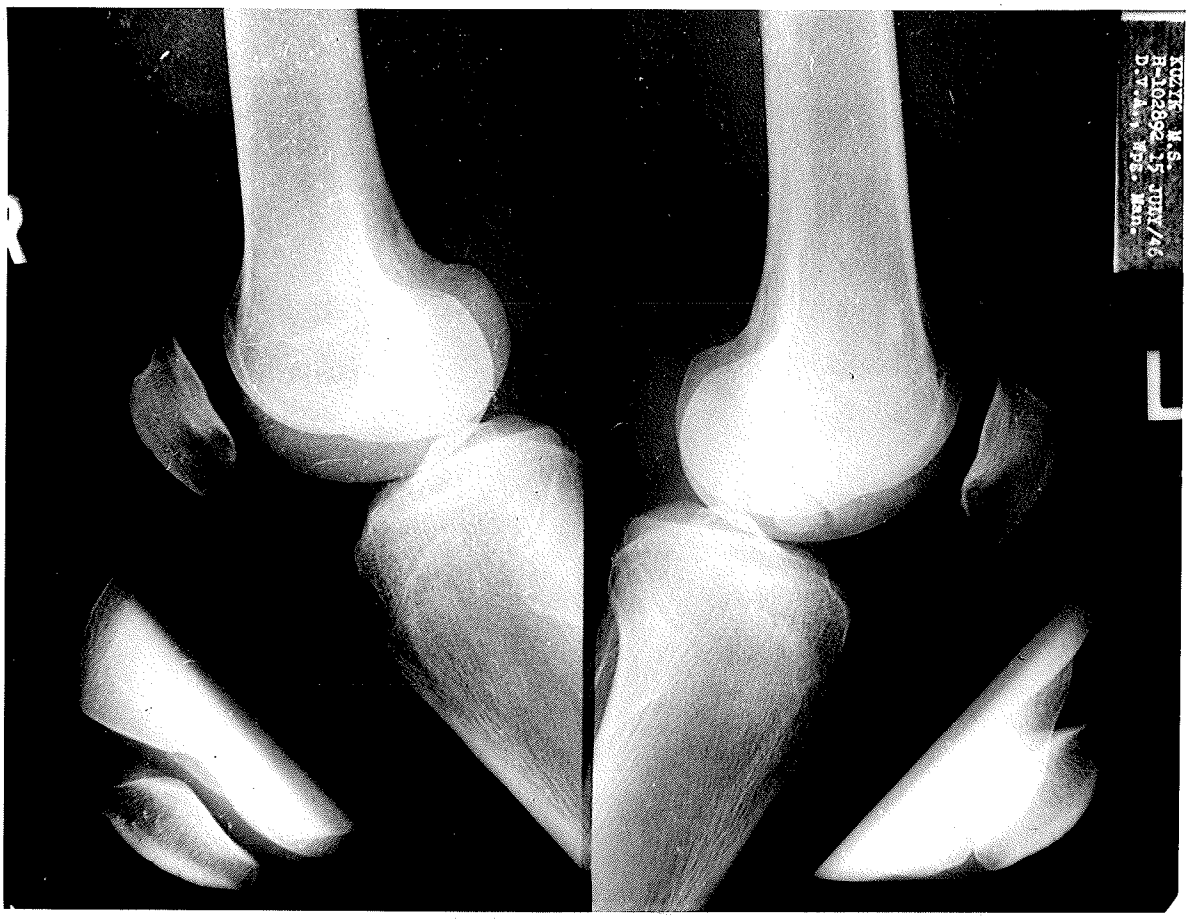

Fig. 6 (b) - July 1946

Lateral views of both knees - lesion is more clearly demarcated in medial femoral Condyle of lt. knee.

It was necessary to use moderate force to pry this portion loose. A rather brisk hemorrhage occurred from the depth of the cavity. This spot was coagulated by diathermy and the joint closed in layers.

X-ray films taken on December 3, 1946, revealed that the area of Osteochondritis Dissecans had been removed; the knee was otherwise normal. (Fig. 6-C)

On December 19, 1946, the patient had complete range of free painless movement. There was no swelling or tenderness. He was discharged as fit to resume his trade.

Case No. 6

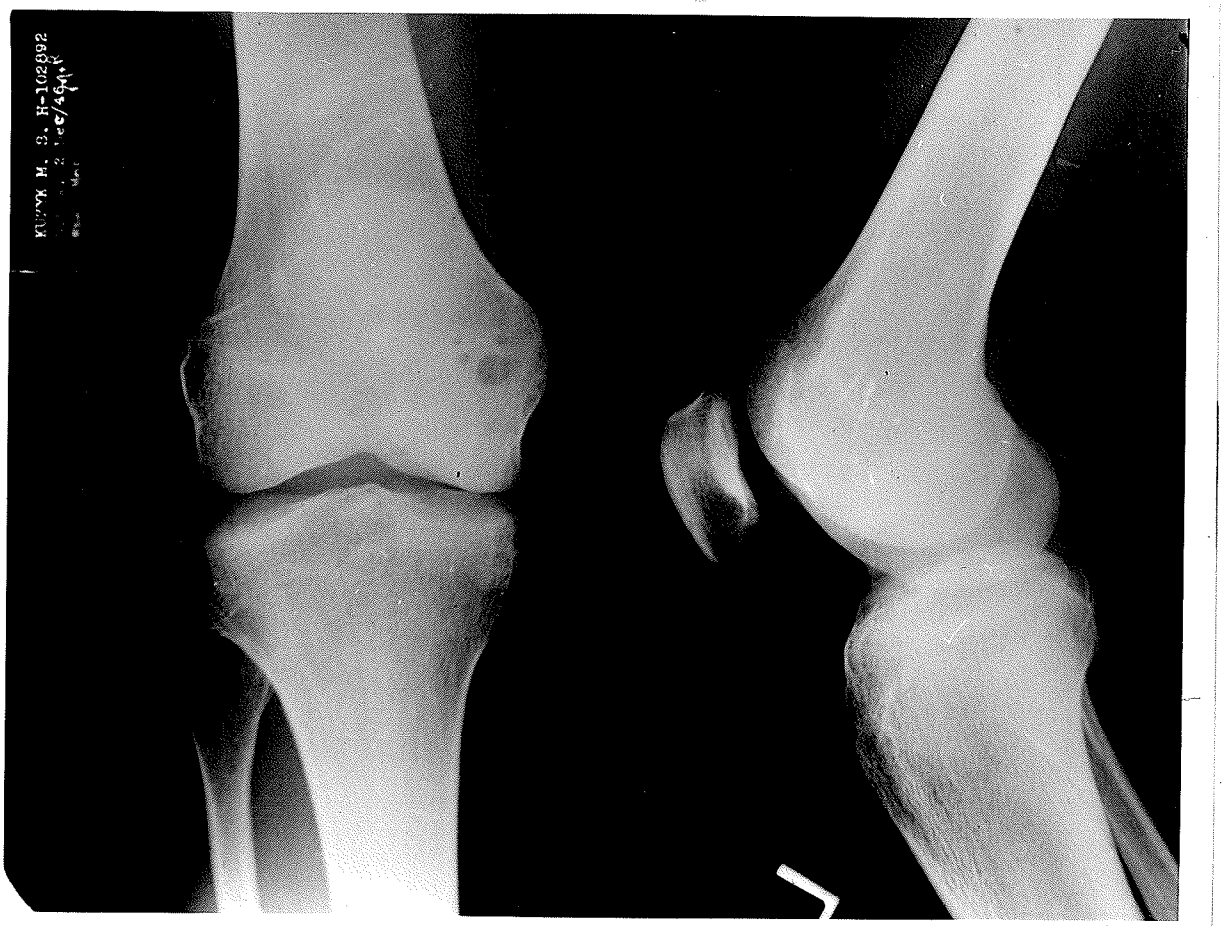

Fig. 6 (c)

Antero-Posterior and lateral views of lt. knee following second operation. Affected area is seen to have been removed.

CASE NO. 25

Illustrating a rare site in both knees of a young girl.

E.D., a young girl of 15, reported to Dr. Gibson September 17, 1946, complaining of pain and swelling of her left knee. Her symptoms dated back to a fall in childhood. Examination at the time was negative except for a slight swelling along the outer side of the patella.

X-ray films of the left knee were reported as follows: "Changes can be seen in the articular surface of the lateral condyle of the femur indicating Osteochondritis Dissecans. A fragment of bone appears to be separating. The examination is otherwise radiographically negative." (Fig. 25).

On October 4, 1946, she complained in addition of a slight ache in her right knee. X-rays revealed a condition similar to that of the left side. (Fig. 25).

Operation was performed at the Winnipeg General Hospital on December 14, 1946. Both knees were opened through lateral para-patellar incisions. A loose fragment of bone in each knee was removed. The patient made an uneventful recovery.

On February 4, 1947, she had a full range of painless movement and was discharged as fit to carry out full activities.

Case No. 25

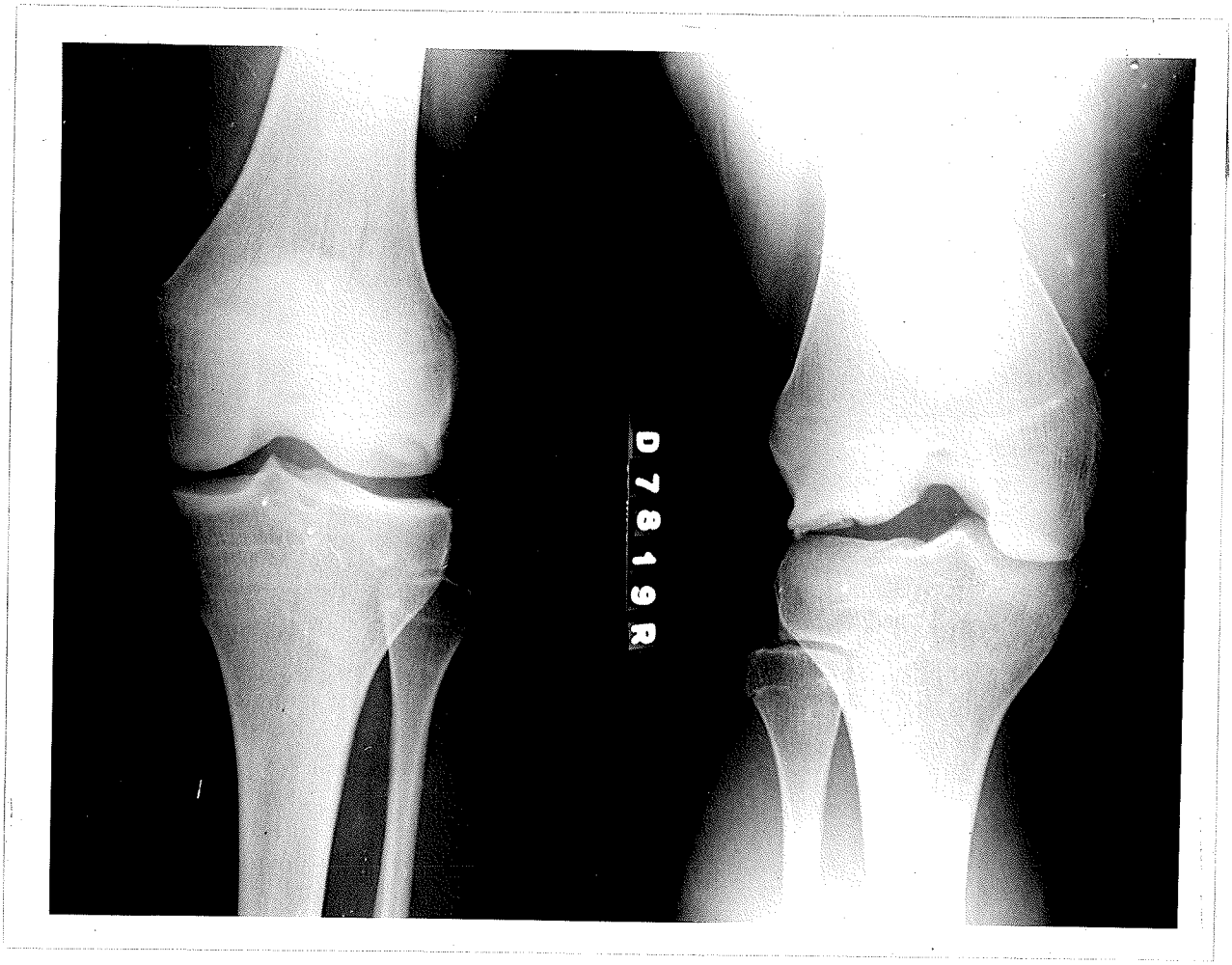

Fig. 25

Antero-posterior views of both knees. Osteochondritis Dissecans is seen in lateral Condyles of both knees.

CASE NO. 17

Illustrating usual site in the ankle

E. L. K., aged 20, a draughtsman by trade, reported on June, 17, 1946, giving a history of pain in the right ankle for the previous three years. He stated that he twisted his right ankle while skiing. Since that time, after any prolonged walk he had noticed pain in his ankle. There was no history of swelling or locking and he was able to carry on with ordinary duties.

On examination of his right ankle there was found to be full range of painless movement, with no tenderness or swelling.

X-ray films showed an area of Osteochondritis Dissecans on the antro-medial aspect of the superior part of the articular surface of the talus. A fragment about the size of a bean was separated (Fig. 17-A).

On June 18, 1946, the ankle joint was opened by an anterior longitudinal incision. The area of Osteochondritis Dissecans on the articular surface of the talus was noted. The area demarcated was pried out with a periosteal elevator and removed. The remainder of the joint appeared normal. The wound was closed in layers.

On July 9, 1946, X-ray films were reported as follows: "The separate bone fragment seen previously has now been removed. An area of rarefaction is present at the site of the Osteochondritis Dissecans." (Fig. 17-B)

Patient stated he could walk and play as he pleased without difficulty. There was full range of ankle movement both actively and passively. There was no swelling, tenderness nor atrophy of the calf and muscle power was good.

The patient was discharged to his usual employment.

Case No. 17

Fig. 17 (a)

Antero-posterior lateral and oblique views of ankle showing clearly demarcated lesion in talus.

Case No. 17

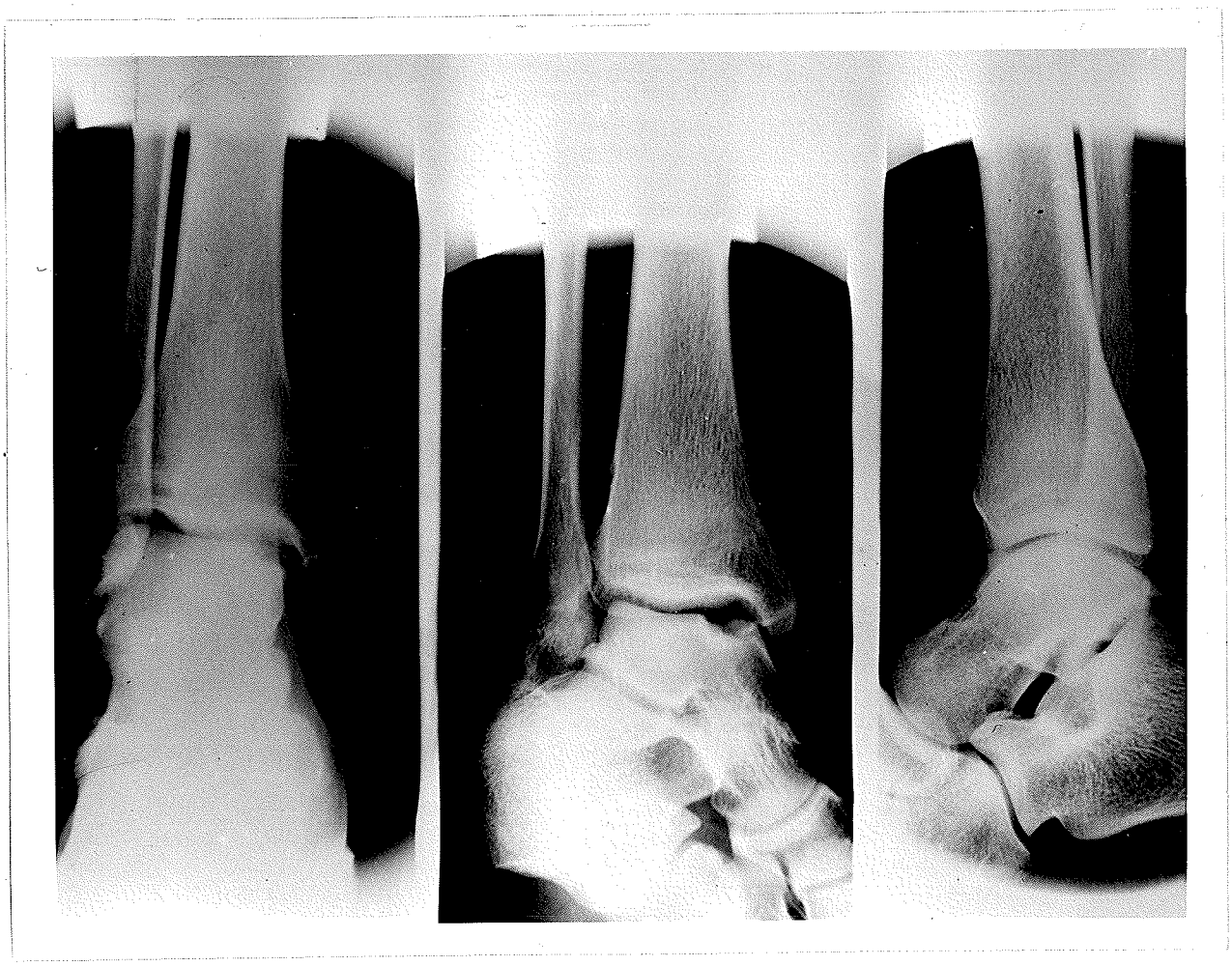

Fig. 17 (b)

Antero-posterior lateral and oblique views of ankle post-operatively. Site of removal of fragment is seen as depressed area in talus.

CASE NO. 23

Illustrating usual site encountered in the elbow joint.

W. E. F., aged 31, a farmer reported on May 18, 1947, complaining of soreness in both elbows dating back to December, 1946. This was aggravated by heavy work such as carrying a pail of water. There was no history of injury. The right elbow in particular had been painful and he was aware of clicks in it when straightening and bending it. The patient's general condition was good. The left elbow was negative. An irregular swelling, smooth in outline was palpable between the lateral condyle of the humerus and olecranon of the right elbow. There was some diminution in power of extension of the right elbow. X-ray films of both elbows were taken. Left elbow was reported negative. Right Elbow: "A small calcified shadow is seen immediately proximal to the proximal radio-ulnar joint. This is in the elbow joint and is probably a loose body. The anterior articular surface of the capitellum of the humerus is irregular and is probably due to Osteochondritis Dissecans". (Fig. 23).

On the 26th of May, 1947, operation was carried out and reported as follows: "Kocher approach into the right elbow joint. Area of Osteochondritis Dissecans found on capitellum, about 1 cm. in diameter, semi-detached. This was removed and the resultant defect in the cartilage smoothed off. The articular cartilage over the head of the radius was found very minimally fibrillated marginally. One large synovial tag was excised from the radio-humeral joint. The remainder of the joint was explored and found to be normal."

The loose fragment was sectioned. (Fig. 23-B).

On July 31, 1947, flexion of the elbow was limited by 10° and extension by 20°. There was full supination and pronation. He was discharged and returned to work on his farm.

Case No. 23

Fig. 23 (a)

Antero-posterior and lateral views of left elbow revealing small loose fragments and area of demarcation of lesion in Capitellum.

Case No. 23

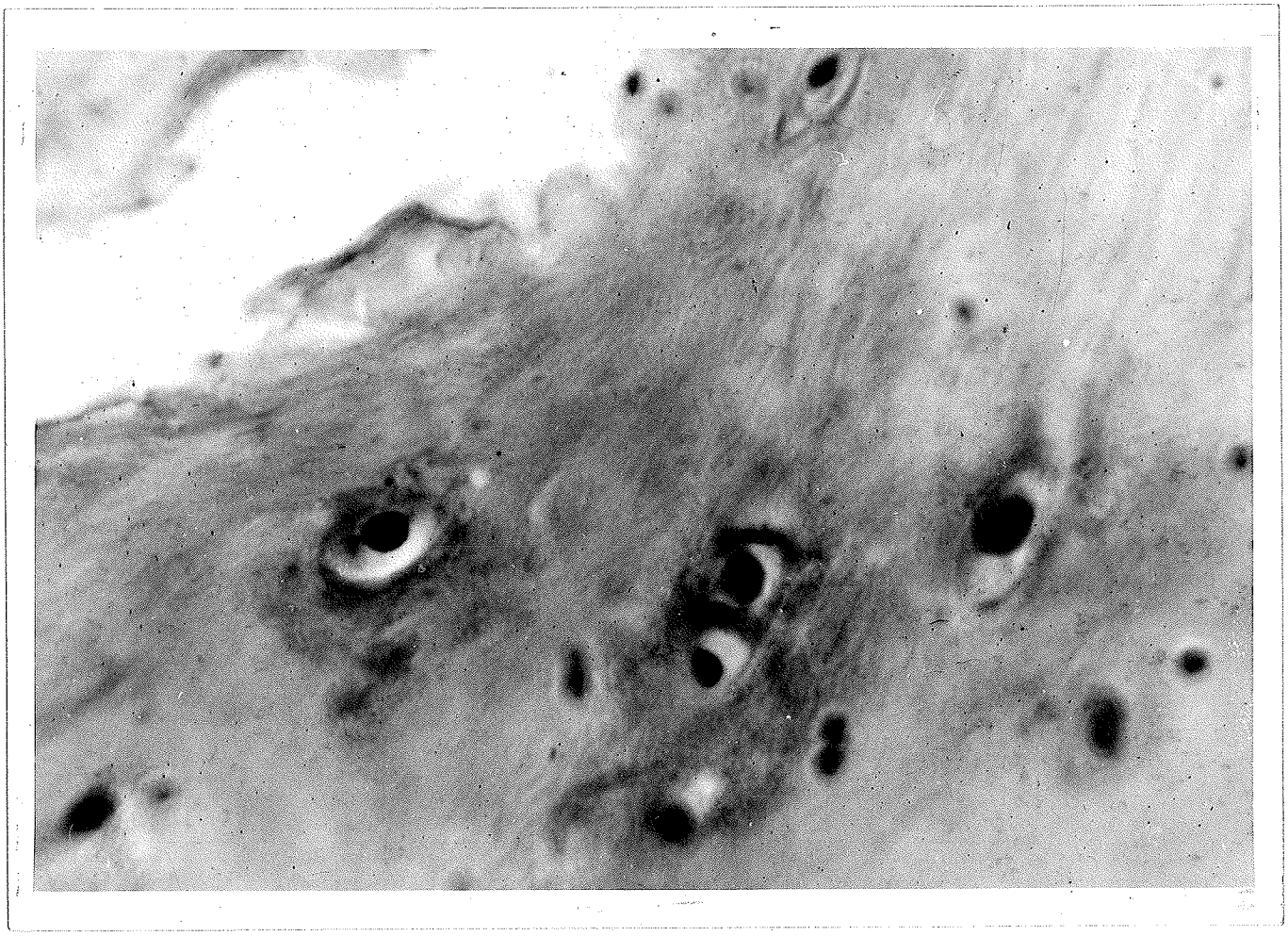

Fig. 23 (b)

Photomicrograph - revealing fibrous tissue, degenerated cartilage cells and some areas of calcification.

CASE NO. 21

Illustrating Supratrochlear Septum of the Humerus as a site for this condition

W. M., 22 years of age, a freight porter by trade, reported to Deer Lodge Hospital on December 4, 1946, giving a history of injury to his right elbow on January 1, 1944. He stated that X-ray films taken on both elbows at that time revealed the presence of a loose body of his left elbow joint, whereas the right was reported negative. An operation was performed on his left elbow in January, 1944, and a loose body removed. He made a good recovery following this operation. In June, 1944, however, he found that his left elbow locked and became painful. He stated that he could replace what he called "chips" into his joint, thus allowing his elbow to become free. The most recent locking occurred on December 1, 1946. On examination general condition was good. Left elbow: There was a well healed non-tender operative scar over the cubital fossa just lateral to the biceps tendon. The contour of the elbow joint was normal with no evidence of fluid present. There was one-half inch wasting of the forearm, 5° limitation of full extension and 20° limitation of flexion. Pronation and supination were intact.

X-ray films of the left elbow revealed loose bodies in the coronoid fossa; apparently arising from the supratrochlear septum. The right elbow joint was negative. (Fig. 21).

Operation was carried out on December 5, 1946 using a Kocher incision. Four loose bodies were removed, two from the olecranon fossa and two from the anterior fossa.

Examination February 6, 1947, revealed almost full range of elbow movement except for limitation of the last 5° of extension and flexion. There were no further episodes of locking. On discharge he was advised to carry on

Case No. 21

Fig. 21

Antero-posterior and lateral view of lt. elbow. Loose fragment is seen in supratrochlear septum of Humerus.

with lighter employment.

This case has been reported in the literature by Drs. H. S. Morton and W. E. Crysler. Since their publication, the patient moved to Winnipeg where he reported to Deer Lodge Hospital.

CASE NO. 20

Illustrating Bilateral Condition in the Supratrochlear Septum of the Humerus

L. K., a clerk aged 21, reported on December 3, 1946. He complained of aches in the right elbow joint of ten years duration associated with appreciable restriction of movement. There was no history of injury. The attacks would occur a few times during the year and last for several days. During the interval he was entirely symptom free. The most recent attack occurred on the day of admission.

On examination general condition was good. The right elbow was swollen. There was only 90° of flexion present and extension was limited by 60°. Supination and pronation were limited in the last 5°. The elbow joint was aspirated and 30 c.c.'s of haemorrhagic fluid removed. Culture of this fluid was reported as revealing no growth.

X-rays were taken of both elbows: The right elbow was reported as follows: "There is a circular, well circumscribed area and apparent bone separation overlying the olecranon at the lower end of the right humerus. The area measured 22 mms. in diameter and had a surrounding area of sclerosis. (Fig. 20-A).

Left Elbow: "A small area of apparent bone separation. One cm. in diameter is noted in the olecranon fossa of the left humerus." (Fig. 20-B).

Operation was performed on the right elbow on January 6, 1947. The joint was opened through a Kocher incision. One large body was removed from the olecranon fossa and two smaller bodies were attached to the synovial membrane. The incision was closed in layers. (Fig. 20-C).

The patient was re-examined on February 7, 1947. He had full flexion

Case No. 20

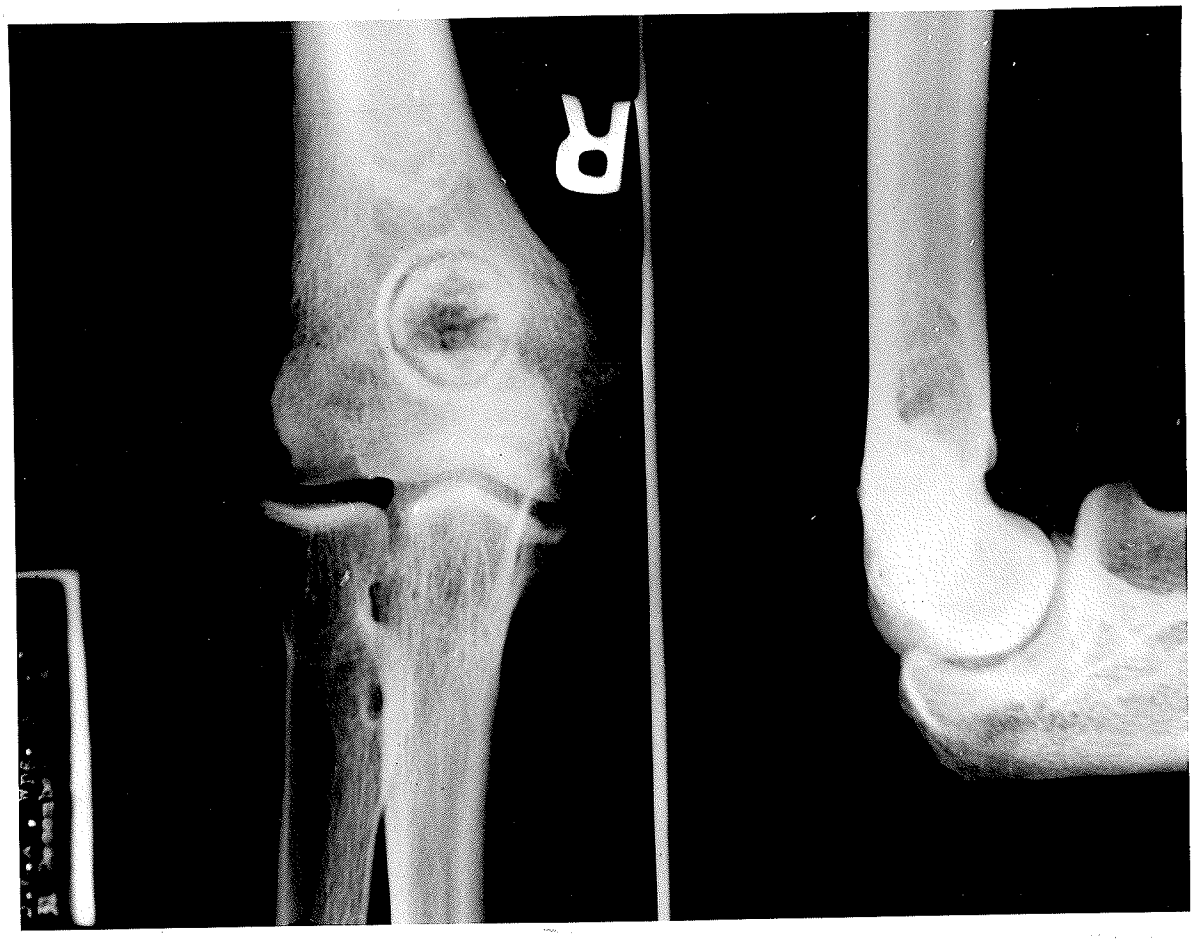

Fig. 20 (a)

Antero-posterior and lateral views of Rt. elbow revealing large circular body demarcated in supratrochlear Septum of Humerus.

Fig. No. 20 (b)

Fig. 20 (b)

Antero-posterior and lateral views of Lt. elbow, revealing similar lesion in supra-trochlear Septum.

Fig. No. 20

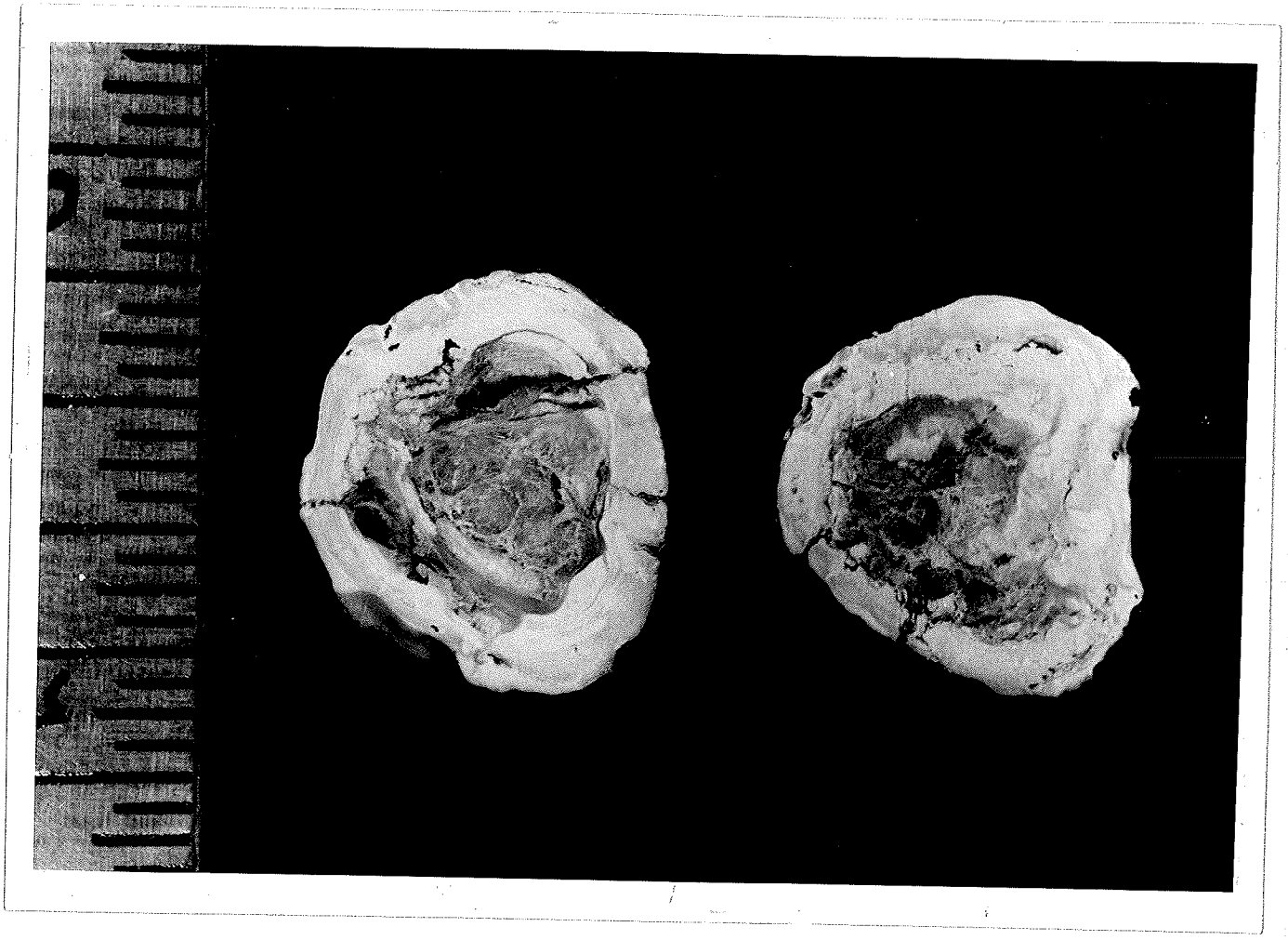

Fig. 20 (c)

Cross-section of large ossicle removed at operation.

of the elbow joint and extension was only limited by 15°. There was full pronation and supination. The patient was discharged to resume his duties as a clerk.

CASE NO. 12

Illustrating Rare Site in the Shoulder Joint.

S. B., aged 26, a real estate agent, reported March 5, 1946, giving a history of recurrent dislocations of both shoulders. He had dislocated his right shoulder in 1941 when he fell on to the shower room floor with his right arm outstretched; Recently his shoulder would dislocate at the least provocation, even during sleep. In addition, his left shoulder had been dislocated in France, 1944 with several recurrences since.

On March 18, 1946, a Bankart repair was performed on the right shoulder. The following is a copy of the operative procedure. "Incision into the deltoid pectoral groove was made and the muscles separated; the coracoid process with muscles attached was exposed. This was removed along with their insertion by means of a chisel. Subscapularis tendon was exposed at incision and resected. On opening the joint a loose cartilaginous body, about the size of a large bean, was noted. In the anterior surface of the lip of the glenoid fossa a small area of cartilage was found missing, apparently the area where the loose body came from. Two holes were bored by hand drill in the region of the defect through the glenoid margin. The capsule was then sutured to the glenoid by means of double heavy black silk inserted through the holes in the glenoid. Subscapularis insertion was then reattached as was also the pectoralis minor, short head of the biceps, coracobrachialis, by means of their common insertion into the coracoid process. The delto-pectoral groove was closed by interrupted sutures and the skin closed with silk."

His post-operative course was uneventful. By June 11, 1946, he had regained good power in his right arm. Abduction without scapular movement was present to 76°. He had regained full internal rotation. External rotation

was present to 40°. As he did not desire any operative repair of his left shoulder the patient was discharged to resume his usual activities.

DISCUSSION

All the patients under consideration were young and in good physical condition. Both before and after operation the patients were instructed in active exercises; in all knee cases, for example, particular attention was given to the development of the quadriceps and hamstring muscles. Post-operatively all the patients were given penicillin, usually receiving 30,000 units every three hours for five days. In all but the occasional case, an incision ensuring wide exposure into the joint was favored. Thus, in the knee joint a medial para-patellar incision was used. In the elbow joint the usual incision employed was Kocher's. In the ankle cases an anterior longitudinal incision was used, and in the shoulder the anterior approach was employed.

The symptoms chiefly complained of were one or more of the following: pain in the joint; swelling and/or locking. Abnormal physical findings when present were those of limitation of movement and/or swelling of the joint. In some cases of long duration muscle wasting was evident as well.

Radiological examination proved to be the most important single method of establishing the diagnosis and in some cases revealing the only positive finding. This was particularly exemplified in Case No. 6, in which, although the lesion was seen on the X-ray film, it still was not demonstrable at operation; and it was not until eleven months later that the fragment was demarcated sufficiently to be recognized at a second operation.

A history of trauma, either direct or indirect was present in nineteen of the twenty-five cases. The duration of symptoms varied from one week to as long as ten years; the average duration being three years. The treatment in all cases was by arthrotomy with removal of the detached fragment or loose bodies. The results were uniformly good. Fifteen cases attained perfect functional activity. Thirteen cases attained complete anatomical recovery. Seventeen cases were able to carry on with their usual full employment.

The site of origin of the loose fragment in this series was as follows:

TABLE 2.

Fifteen Knee Cases	
Medial femoral condyle	9 cases
Lateral femoral condyle	2 cases
Patella	1 case
Medial femoral condyle and Patella	2 cases
Seven Elbow Cases	
Supratrochlear septum of humerus	4 cases
Capitellum	3 cases
Two Ankle Cases	
Superior-medial angle of the Talus	2 cases
One Shoulder case	
Glenoid rim of the Scapula	

Additional locations for this condition have been outlined by Stein et al.[15] These included "the superior and lateral aspect of the articular surface of the femoral head; the articular surface of the head of the humerus and the articular and distal end of the metatarsal bone."

Pathology: When the fragment was still loosely adherent on removal the specimen presented two surfaces; a smooth convex surface corresponding to the articular cartilage; and a concave irregular surface corresponding to the area of bone defect. In those cases in which the fragment was found lying free or loosely attached to the synovium, the loose body presented a smooth elliptical contour. In cross-section it consisted of an outer smooth cartilage plate surrounding a central darkened area of necrotic bone and calcified cartilage. The microscopic picture was that of an aseptic necrosis, with areas of fibrosis and occasional foreign body giant cells.

Etiology: This is still far from settled. Various theories have been outlined earlier in the thesis. From the findings in this series, certain points are worthy of note. Trauma, either direct or indirect, apparently in some cases is a definite factor. This was exemplified in the case of the patient who injuried his ankle while skiing and later revealed a typical lesion in the superior medial aspect of the Talus. (Case No. 17)

The effect of interference with the blood supply was vividly revealed in Case No. 6. The process of separation was shown to commence from the deep surface as, although the fragment was outlined by X-ray, the articular surface appeared normal at the first operation. It was not until eleven months later that the separation had extended to the surface to enable the fragment to be pried out. On levering out the loose fragment, a brisk hemorrhage occurred from the mid center of the depth of the cavity. This appeared to be coming from a vessel and required electro-coagulation to control it.

The anatomical peculiarity of a thin supratrochlear septum of the humerus in some individuals is an apparent cause for the separation of an ossicle from this site. In the cases encountered in this series all appear to bear this factor out. In one the condition was bilateral. (Case No. 20) The physical predisposition in the individual as a factor in the etiology of Osteochondritis Dissecans is further exemplified in the case of the young girl who developed this condition in the lateral condyle of both knees. (Case No. 25). Just what the factor is has not been determined.

Thus, from this series, it appears the etiology of the condition may be due to one of three factors or more likely a combination of these.

1. Trauma, direct or indirect.
2. An interference with the vascular supply of a segment of articular surface.
3. A physical or constitutional predisposition.

Differential Diagnosis: The main problem in isolating this entity of Osteochondritis Dissecans from the group of fifty cases of loose bodies encountered in the resume of arthrotomies, was that group of loose bodies classified as synovial chondromata. In the latter condition X-ray examination reveals numerous loose bodies with no evidence of any bone defect. Prior to operation on the knee the possibility of lesions of the menisci was considered in all cases. However their typical history and absence of radiological findings excluded them from this group.

Several cases which one classifies as an Osteoarthritic group, closely resembled Osteochondritis Dissecans. However, these were excluded on radiological findings which, in two cases in particular, revealed marked hypertrophic changes suggesting that loose bodies had arisen from broken projecting spurs.

Sesamoid bones such as found in the head of the gastrocnemius may be slightly puzzling, but the absence of symptoms and signs and the characteristic situation as revealed by X-ray, make their diagnosis clear.

The various groups of aseptic necrosing lesions encountered in the human skeleton present some possibility of

being placed in the same class as Osteochondritis Dissecans. For example, there were two cases of Freiberg's disease of the metatarsal bones in which the pathological picture was identical with that of Osteochondritis Dissecans. However, this condition was considered a separate entity and the cases were not included in this series.

Tuberculosis did not arise as any problem in differentiation. The history and particularly the roentgenogram appearance invariably allowed one to rule out this condition.

In the three hundred arthrotomies reviewed, no other differentiating problems were encountered.

CONCLUSIONS

1. Osteochondritis Dissecans is more common than heretofore considered.
2. The medial femoral condyle is the commonest site.
3. The Supratrochlear Septum of the Humerus is confirmed as a relatively common site encountered in the elbow.
4. The importance of X-ray examinations in all cases, both of the affected and contra-lateral joint, is noted.
5. The condition has been shown to occur bilaterally in the knee and elbow joints.
6. In addition to the usual sites in the knee, elbow and ankle, atypical sites have been described in the shoulder, hip, carpal, metatarsals and phalanges.
7. The usual age group is that of early adult life; however, the condition has been described in a child of four years of age.
8. The etiology of this is still in doubt; the main factors being trauma, interference with the vascular supply and an underlying constitutional or anatomical peculiarity.

9. Treatment by Arthrotomy and removal of the detached fragment or loose body was carried out with good results in all cases.

10. Adequate exposure of the joint affected is recommended.

11. Attention is drawn to the probability of encountering loose bodies in the shoulder joint during operative repair for recurrent dislocations. These are probably present much more often than is suspected. They are symptomless.

SUMMARY

1. Twenty-five cases of Osteochondritis Dissecans have been presented.

2. The historical review of the condition has been outlined.

3. Conclusions have been formulated from the features of this series and a study of the pertinent literature.

NOTE: The author wishes to thank Dr. A. Gibson for permission to report his case.

He also wishes to thank the photographic department of Deer Lodge Hospital for their cooperation in the preparation of the illustrations.

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APPENDIX

Case No. 1

D. F. H., a truck driver, 32 years of age, reported on March 22, 1945, complaining of occasional locking of the right elbow and dull ache in the right forearm, aggravated by lifting. While cranking a car, in 1939, the engine back-fired and the crank struck his elbow. He was treated by a chiropractor and was told that he had his elbow set. He had very little trouble until recently when his elbow ached after he did heavy work in a saw mill hauling logs.

On examination, the right elbow showed no swelling. Limitation of extension was by about 10^{o} and of flexion 5^{o}. There also was 10^{o} limitation of supination.

X-ray revealed two loose bodies in the right elbow joint.

Operation was performed, on the 3rd April, 1945, a Kocher incision being made. Two calcified cartilaginous bodies were removed from the joint. There was a definite area of Osteochondritis found in the articular surface of the lateral condyle of the humerus -- the site where the loose bodies had originated.

He reported for examination of June 15, 1945. There was good movement in the elbow, still about 10^{o} limitation of flexion and extension - no other complaints.

He returned to his occupation.

Case No. 2

S. R., a soldier, 24 years of age, reported on February 27, 1945. He complained of swelling and weakness of the right knee, with inability to flex it beyond a right angle. There was a history of a shrapnel wound in July, 1944, to the lateral side of his right knee. Repeated operations followed this to clean up the wound which had repeatedly broken down. This was finally skin grafted. Except for the shrapnel wound, there was no other history of injury.

On examination of the right knee there was good muscle control. An irregular scar in the lateral aspect of the thigh just above the knee was noted. There was slight effusion in the joint. Extension was limited to 107°, flexion to 90°. The cruciate and lateral ligaments were intact.

On April 14, 1945, X-ray of the right knee was reported as follows: "A fairly large defect is present in the lateral aspect of the articular surface of the medial femoral condyle. Numerous loose bodies are present within the defect. The appearance is that of an Osteochondritis Dissecans."

On April 20, 1945 - operation was performed - a medial para-patellar incision being made. Osteochondritis was noted in the anterior articular surface of the medial condyle, and in a small area of the articular surface of the patella. Two loose bodies were removed and the wound was closed in layers.

On June 22, 1945 - there was complete range of knee movement and, operative scar was well healed.

The patient was discharged at this time and returned to duty.

Case No. 3

L. A. T., a clerk, 25 years of age, reported on April 17, 1945 - stating that in August 1942 at Dieppe, he received a shrapnel wound to the left knee. He had recovered completely after this injury and was discharged to duty on September 15, 1942. Since that time, however, he complained that his knee stiffened up after prolonged exercise and that he had to limp when he ran.

On examination of left knee - there was no swelling, no muscle atrophy, no abnormal mobility, and flexion and extension were normal. He had a slight irregular scar in the outer upper side of the patella which was non-tender, or adherent.

X-ray of left knee revealed a small M.F.B. above the epicondyle on the lateral side. There was also an area of Osteochondritis Dissecans on the lateral part of the medial condyle of the femur posteriorly. (Fig. 3)

Operation was performed, on the 23rd April, 1945, and joint opened by a medial para-patellar incision. An area of Osteochondritis Dissecans $\frac{1}{2}$" in diameter and 1/3" thick was removed from the lateral aspect of the medial condyle. The rest of the knee appeared normal. He made an uneventful recovery and was discharged on May 20th, fit for work.

He was admitted with an attack for acute appendicitis on September 5, 1946. There were no compalints regarding his knee, and full range of movement was present.

Case No. 3

Fig. 3.

Antro-posterior and lateral views of the knee. Typical site is clearly outlined.

Case No. 4

W. K., a carpenter, 39 years of age, reported on August 29, 1945, complaining of soreness and pain in the right elbow. Symptoms began in 1940, when his elbow had locked. However, it slowly improved and he was able to return to work. Since that time it has been aching intermittently.

On examination his general condition was good. There was no limitation of flexion of the right elbow - extension was limited by 5°. Supination and pronation were complete. X-ray revealed the presence of loose bodies in the right elbow joint in the supra-trochlear septum of the humerus. (Fig. 4)

On September 5, 1945, two separate incisions were made, and loose bodies were removed. One from the elecranon fossa, the other from the antro-lateral aspect of the joint.

On January 15, 1946, patient stated he still had pain in his right elbow joint on lifting heavy objects. On examination, all movements were normal, the wound was well healed and not tender.

X-ray film of both elbow joints were negative. However, he claimed that he had difficulty carrying on with his trade.

Case No. 4

Fig. 4

Antero-posterior and lateral views of elbow. Ossicle is defined in Supratrochlear Septum of Hunerus.

Case No. 5

D. A. Y., a farmer, 23 years of age, reported on November 30, 1945. He stated he was originally injured when he was knocked against a wall by a blast in March 1945 in Germany. He struck his right knee but was able to walk on it. The knee swelled up quickly and he was treated at hospital, where it improved quickly with rest. Subsequently his knee locked on one occasion but there was no swelling. The last two months he had been fairly free of symptoms except for an occasional sharp pain in the upper border of the patella when walking.

On examination of right knee, there was no effusion. There was slight laxness in the anterior cruciate ligament and slight tenderness over the lateral aspect of the knee. There was a full range of movement, no thigh wasting and about one-half inch wasting of the calf. When the knee was brought into full extension the patient complained of a sharp stabbing pain.

X-ray films on December 6, 1945, revealed an area of Osteochondritis Dissecans in the medial femoral condyle. (Fig. 5a)

Operation was performed on January 24, 1946, the joint being exposed by a medial para patellar incision. The area of Osteochondritis Dissecans noted over the lateral surface of the medial femoral condyle was levered out. The wound was closed in layers. Miscroscopic section of the specimen showed atrophic bone and cartilage tissue. (Fig. 5b)

On April 9, 1946, there was full painless movement. Discharge was delayed temporarily because of respiratory infection. The patient was considered to have had a satisfactory result.

Case No. 5

Fig. 5(a)

Antero-posterior and lateral views of Rt. knee. Typical site is seen in the medial femoral Condyle.

Case No. 5

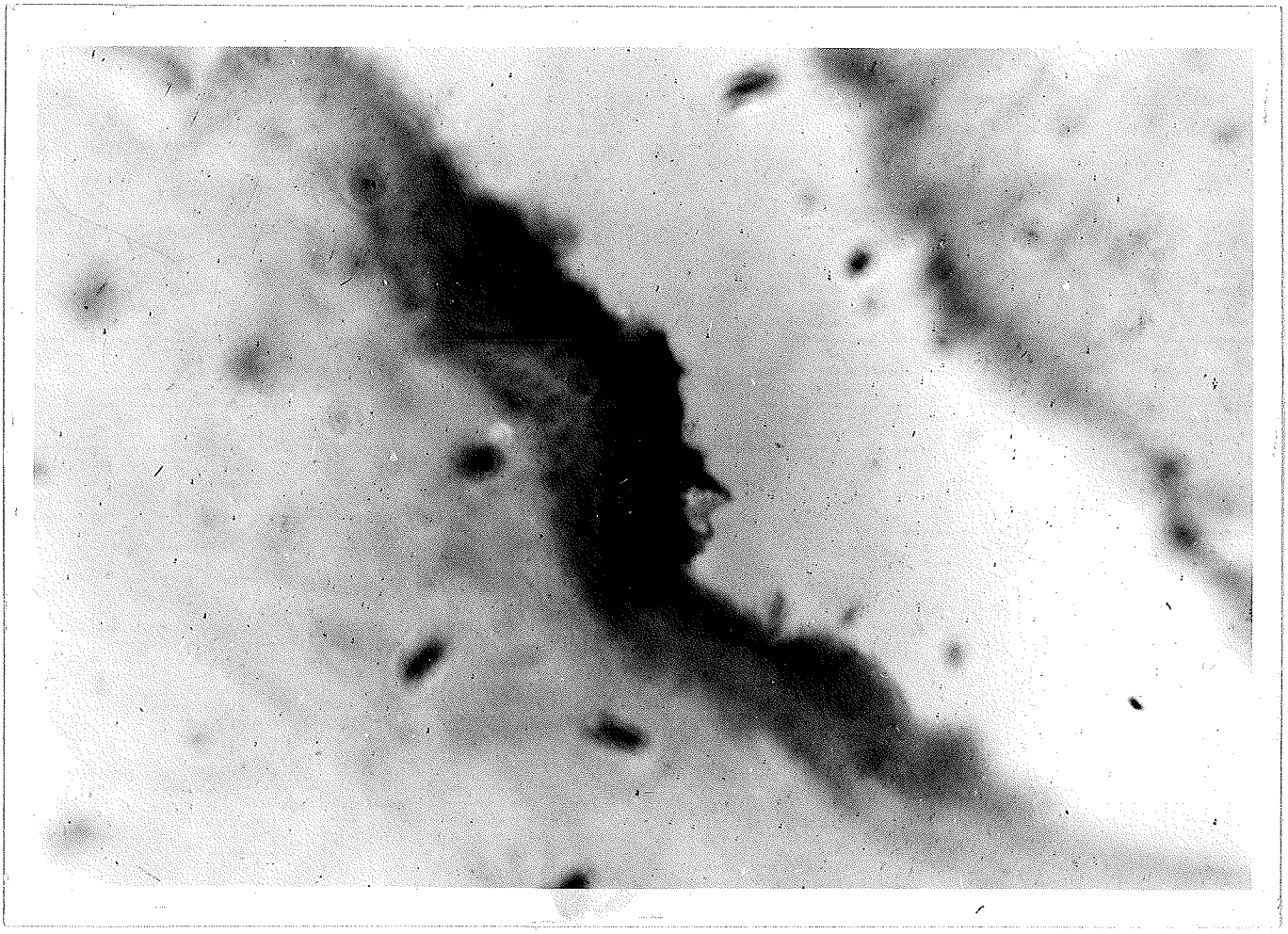

Fig. 5(b)

Photomicrograph - showing atrophic bone and cartilage tissue.

Case No. 7

W. A. M., a bank accountant, 29 years of age, reported with a history of frequent locking of his right knee. He recalled that he had sustained slight injury to his knee about eight years ago but, had very little trouble following that. Since February, 1943, however, his knee had locked quite frequently, as often as once every day. He thought he could feel a loose body and he relieved the locking by pushing it up into the supra-patellar pouch. In addition, he stated that his knee would swell and he used to wear an elastic bandage.

On examination, there was slight swelling of the knee, but no limitation of movement, or laxness of the cruciate or colateral ligaments. The radiologist reported a calcified loose body about the size of a large bean in the superior recess of the knee. (Fig. 7)

He was operated on in January 29, 1946. A medial para patellar incision was made, and a loose body removed from the supra patellar pouch. A $\frac{3}{4}$" circular defect on the posterior aspect of the medial femoral condyle was found.

On examination on March 22, 1946, the patient had a full range of motion. There was still 1" atrophy of thigh. He was discharged and returned to his usual employment.

Case No. 7

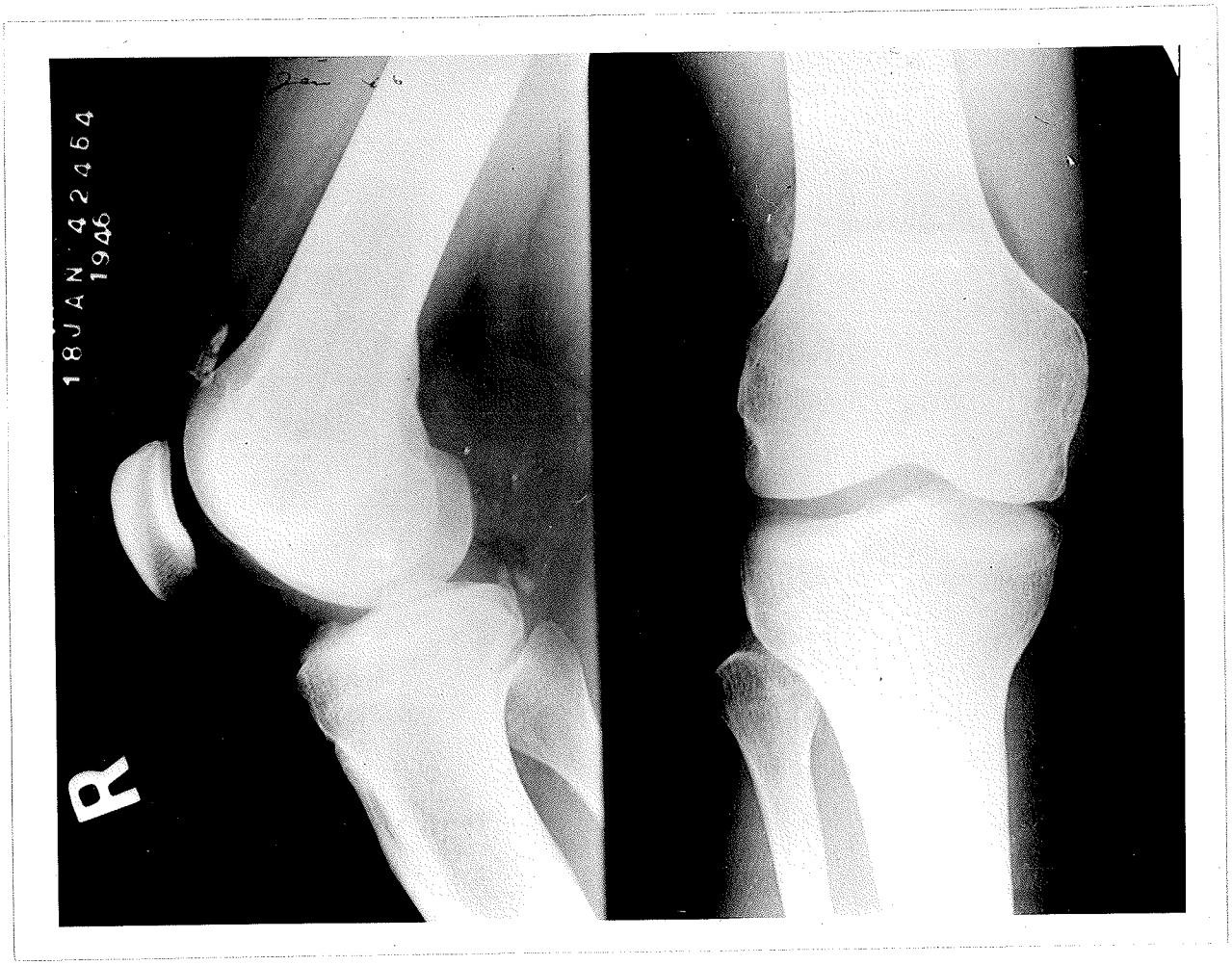

Fig. 7

Antero-posterior and lateral views of Rt. knee. Loose fragment is seen in supra-patellar pouch. At operation this was seen to arise from posterior aspect of medical femoral Condyle.

Case No. 8

L. R. H., a farm laborer, 23 years of age, reported to the hospital on February 22, 1946. He gave a history of a twisting strain of the left knee in May, 1942, followed by pain and swelling for two weeks. Since that episode he has noticed a loose body in the joint which occasionally caught on the knee cap, causing pain and swelling.

On examination there was full movement, no wasting of the thigh muscles, and no laxness of the cruciate or co-lateral ligaments. A firm movable body was palpable over the lateral aspect of the supra-patellar pouch when the knee was flexed. X-ray films revealed a calcified body in the supra-patellar pouch and some roughening of the articular cartilage of the patella.

On March 2, 1946, a lateral para patellar incision was made, and a large loose body 1½" in diameter was removed from the supra-patellar pouch. The loose body was considered to have arisen from the defect in the patella.

Examination of April 15, 1946, recovery was good. The patient had complete function and no wasting. He returned to his work as a farmer.

Case No. 9

G. E., laborer (unemployed), 23 years of age, gave a history that he had sustained a gun-shot wound on the 12th of September 1944 which resulted in a compound fracture of his right leg. This condition cleared up satisfactorily. However, he noted occasional swelling of his left knee about which he was chiefly concerned.

Examination of February 26, 1946, revealed slight swelling of the left knee. Movements were free and there was no undue mobility. X-ray films of both knees were reported as follows: "Left knee - a small calcified shadow is seen posterior within the joint space and is considered a loose body. A dense round shadow is present in the medial condyle and likely is a large Osteochondritis Dissecans. Right knee - a small round shadow is seen which in all probability is a loose body."

On March 8, 1946, the left knee was opened by two incisions, one antro-medial and one postero-lateral. A loose body was removed from each space. The medial condyle was the site of an old Osteochondritis Dissecans which appeared to be healing.

On May 8, 1946, he had no complaints regarding his left knee. There was full range of movement and power was excellent. Check X-rays of the left knee revealed that the loose body had been removed. The irregular area on the anterior portion of the medial femoral condyle was again seen.

On June 5, 1946, he was checked regarding his right knee. In view of the minimal findings present, i.e., very slight laxity

Case No. 9 (Cont'd.)

of the anterior cruciate ligament, it was felt that no operative interference should be undertaken at the time. He was discharged.

Case No. 10

B. P., a fisherman, 26 years of age, reported on February 25, 1946. He gave no definite history of injury, but for the past two years he found that after walking he developed an ache in the posterior part of his knee. Occasionally he felt the knee give under him. There was no swelling, and no pain was experienced on kneeling. Although he reported this several times, he felt the validity of his complaints was doubted. There was no evidence of X-rays having been taken at that time.

Examination of the left knee revealed slight limitation of flexion in the last 10° and about 5° limitation of extension. Cruciate and co-lateral ligaments were intact. X-ray films showed an area of Osteochondritis Dissecans on the lateral surface of the medial condyle of the left femur. (Fig. 10)

Operation - an antero-medial incision into the left knee was made at the joint level. The osteochondritic area measuring about the size of a twenty-five cent piece was excised. No other pathology of the joint was noted. The wound was closed in layers.

On the 16th of April, 1946, when the patient was examined, he stated that he was able to walk three miles without any trouble.

On the 30th of April he was examined again. There was no pain or swelling in the left knee. He still had $\frac{3}{4}$" atrophy on the left thigh.

He was discharged at this time and returned to work as a fisherman.

Case No. 10

Fig. 10

Antero-posterior, lateral and tangenital views of knee revealing typical lesion in medical femoral Condyle.

Case No. 11

J. H., a mechanic, 21 years of age, reported on the 26th February, 1946, with a history of injury August 1945, when he twisted his right knee while playing volley ball in Holland. The knee became painful and swollen. It was held in a position of approximately 45° flexion for about ten days. He resumed his duties for a month and then again he had a recurrence of locking, pain and swelling of his right knee. He stated that since this injury he had noticed loose bodies in the area of his right knee, which caused pain when they slipped into the joint. On examination movements of the right knee joint were full and free. There was no swelling. A loose body was felt in the supra patellar pouch. An X-ray film revealed the presence of loose bodies in the knee joint.

On May 14, 1946, the knee locked again and a loose body was palpable.

On June 13, 1940, X-ray films were reviewed. There was suggestion of an area of Osteochondritis Dissecans on the lateral side of the medial condyle of the femur.

On June 21, 1946, an operation was performed. The previous scar was excised and the incision extended to make a complete para patellar incision. The knee joint was fully exposed. A loose body was removed from the supra patellar pouch. On the medial condyle an area of $1\frac{3}{4}$" in diameter was eroded to a depth of at least $\frac{1}{4}$". Two small fragments were removed from this area, and the cavity was smoothed. The joint was closed in layers.

Case No. 11 (Cont'd.)

On August 15, 1945, patient had free full movement of the knee joint, and there was no tenderness in the scar.

On April 19, 1947, the patient reported back complaining that he thought he felt another loose body in the other side of his right knee just underneath the patella. The previous operative wound was now well healed and was not adherent or tender. All movements of the knee joint were complete. The cruciate and colateral ligaments were intact. There was ¾" atrophy of the right thigh. X-ray films were reviewed. The irregularity in the femoral condyle was again seen but it was appreciably improved since the last film of the 23rd January, 1946. No loose body was seen at this examination.

On the 30th April, 1947, it was deemed advisable to allow the patient to return to work and he was advised to report back if his condition interferred with his work. To date he has not returned.

Case No. 13

H. N. D., an Air Gunner, 19 years of age, reported on March 22, 1946. While home on leave, March 15, 1946, he slipped and fell on the icy path injuring his left knee. He landed heavily on this knee and he twisted it at the same time. The knee was very swollen and painful during the next twenty-four hours. On examination, the left knee was slightly swollen. There was limitation of complete extension, and flexion was restricted by about 20^{o}. There was slight tenderness over the lateral condyle posteriorly and over the medial condyle anteriorly. X-rays of the knee revealed a small defect over the lateral condyle of the femur posteriorly.

On April 18, 1946, further X-rays revealed a small calcified shadow over the lateral femoral condyle.

Operation was performed on April 25, 1946. A lateral para-patellar incision was made to expose the knee joint fully. A flake of bone roughly $\frac{3}{4}$" in diameter was found in the lateral synovial fold. Two small pieces of cartilage were found in the supra-patellar pouch. These loose bodies were removed. A denuded area was found on the posterior lateral aspect of the external condyle of the femur. This area was covered with a whitish glistening tissue resembling cartilage. The wound was closed in layers.

The patient was examined on June 26, 1946. There was no complaints. All movements of the knee were full, free and painless. There was no abnormal movement or effusion. It was considered that a good result was obtained and he was discharged to duty.

Case No. 14

A. M., a fisherman, 31 years of age, reported on April 1, 1946. He complained of having pain in his left elbow following a car accident in October, 1942, when the posterior lateral aspect of the elbow joint was lacerated. He was incapacitated for 42 days, however, following this he was able to proceed overseas. Except for a slight stiffness in his elbow, he was able to carry on. Since his discharge, however, when he attempted to do heavy work such as shovelling coal, the pain in the elbow had become more severe. There was no history of locking.

Examination of left elbow revealed a well healed scar over the region of the head of the radius. There was no evidence of any muscle wasting. Movements were free with the exception of 10° limitation of flexion.

X-ray films showed a round calcified loose body. Irregularity was seen in the medial aspect of the coronoid process of the elbow.

On operation, a Kocher incision was made. A loose body about $\frac{1}{4}$" in diameter was found lying near the head of the radius. This, along with a small rice-like body, was removed. The wound was closed in layers.

On July 3, 1947, X-ray films of the elbow were clear. There was no pain in the elbow, but there was limitation of the last 10° of flexion. He was discharged at that time.

Case No. 15

W. L. S., a miner, 24 years of age, reported on April 25, 1946, regarding his right elbow, which had bothered him since May, 1945. There was no definite history of injury. The elbow was sore and swollen for a few days and he found then he could not bend or straighten it completely. He has never been able to fully extend his elbow since. It has locked occasionally, and he was able to unlock it by twisting the joint. He has not noticed any swelling.

On physical examination his general condition was good. There was no swelling in the right elbow. Extension was present to 180°; flexion to 46°. There was normal power in the muscles about the joint. X-ray film revealed a circular loose body in the supra-trochlear septum. (Fig. 15)

Operation was performed on April 30, 1946. A Kocher incision was made into the elbow joint. A loose body, the size of a lima bean, was removed from the coronoid fossa. Joint surfaces appeared normal. The wound was closed in layers.

On June 7, 1946, movements were as follows: Extension 160°, flexion 35°. There was full pronation and supination. There were no complaints of any pain.

On June 30, 1946, extension was 170°. There was complete flexion and excellent strength, with no pain on movement. He was discharged.

Case No. 15

Fig. 15

A. P. and lateral views of elbow revealing ossicle arising from Supratrochlear Septum of Humerus.

Case No. 16

W. K., a farmer, 24 years of age, first reported on April 26, 1946. He stated that during training he injured the right knee when he twisted the joint falling into a hole. The knee became swollen and he limped for several days.

On September 5, 1946, he felt something in his joint which appeared to puff out from under the knee cap. He reduced the lump by pressing it back into the knee joint. This had occurred approximately every two weeks, expecially when climbing stairs.

On examination of the right knee there was a full range of painless movement. There was $\frac{1}{2}$" wasting of his thigh muscle. There was no evidence of laxness of the cruciates or colateral ligaments.

X-ray films revealed an area of Osteochondritis Dissecans in the medial condyle of the femur and the presence of a loose body within the medial pouch of the joint. (Fig. 16)

On April 30, 1946, an operation was performed. A medial para patellar incision was made, and a loose body the size of a lima bean was removed from the intercondylar space. The anterior ligament was found to be split longitudinally with the anterior half lax. The articular surface of the femoral condyle and of the tibia appeared normal as far as could be visualized. The wound was closed in layers.

On June 2, 1946, the patient had a complete range of movement.

He was examined again on the 20th of that month. There was no pain in the knee, and flexion and extension were complete.

Case No. 16

Fig. 16

Antro-posterior view of knee. Calcified loose body is seen in intercondylar fossa.

Case No. 16 (Cont'd.)

He was discharged, and returned to farming.

Case No. 18

A. W. D., a miner, 29 years of age, reported on the 19th of September, 1946. He recalled a history of injury to the medial side of the left knee while playing soccer when he was fourteen years old. His knee swelled and was sore for several days. Since then this knee would "kick out."

He stated that he recently injured his knee on August, 1946. While walking down hill, the knee gave way and he fell to the ground. It remained swollen and he was aware of a nodule on the inner side of his knee cap.

Examination of the left knee revealed evidence of effusion. Extension was present to 150°--flexion was complete. There was no laxness in any direction. One inch wasting of the thigh muscle was noted. A small palpable nodule was present over the femoral condyle just lateral to the patella. X-ray of the knee revealed evidence of this small loose body.

On September 26, 1946, the knee was opened by a medial para patellar incision. A loose body 1 cm. in diameter was removed from the supracondylar space. An area of Osteochondritis Dissecans was noted in the anterior surface of the lateral condyle of the femur. This area appeared to be healed. The articular surface of the patella was irregular. However, no definite necrosis was seen. The knee joint was closed in layers.

The patient was examined on November 14, 1946. He was considered to have had an excellent result. Movements of the knee were free and painless. There was still ½" wasting of the thigh. The patient was discharged and returned to this employment.

Case No. 19 (Cont'd)

area on the superior surface of the talus were noted to be irregular and revealed the areas of Osteochondritis. The irregular area of the talus was curetted and smoothed. The wound was closed in layers.

On February 15, 1947, there still was very slight swelling noticeable about the ankle joint. On the 5th of March, 1947, no further history of locking or pain in the ankle was given. Movements of the ankle were painless and free in all directions. There were no points of tenderness. There was still ¾" wasting of the calf muscles. He was discharged to duty.

The patient was examined on December 1, 1947. He was able to stand on tip-toes. Movements of ankle were painless and free. He reported that he was able to carry on with his work which entailed walking all day long.

Case No. 22

T. R. M., a salesman, 32 years of age, reported on the 10th of April, 1947, at which time he complained of aching and locking of his left knee. He stated he first injured his knee in October, 1944, when climbing over rocks in the Leopold Canal.

Since September, 1946, locking of the knee would occur when the joint was brought to a right angle. It has occurred as often as three times a day, particularly on rising from a chair.

On examination of the left knee, there was no atrophy of the muscles, no swelling of the joint, the cruciate and co-lateral ligaments were intact and movement was complete. There was some tenderness over the medial femoral condyle.

X-ray report stated: "There is suggestion of area of the cortex of the articular surface of the medial condyle of the femur which may be loose."

On April 25, 1947, an operation was performed, a medial para patellar incision being made. An area of loose cartilage was demonstrated on the medial condyle. This was shaved off to bone and curetted. In addition, a large central area of softening was found in the cartilage of the patella, and removed. A thorough search for loose bodies was made but none were demonstrated. There was no further evidence of injury to the joint structures. The wound was closed in layers.

The patient was examined on August 6, 1947. He still

Case No. 22 (Cont'd.)

had stiffness in his knee and a loud crack could be heard. Flexion was present to 145° and there was full extension. There was ½" atrophy of the thigh muscles. It was decided to let the patient have a try at his job with a knee corset; if he were unable to carry on, a patellectomy would be considered.

Check X-ray on August 11, 1947, revealed a slight irregularity in the medial femoral condyle, otherwise negative. The patient moved to the West Coast to work as a furniture salesman.