

GLASGOW MEDICAL JOURNAL

VOL. 31 (Vol. 149 Old Series).

JUNE 1950

No. 6

THE JOURNAL OF THE ROYAL MEDICO-CHIRURGICAL SOCIETY OF GLASGOW

INJURIES OF THE SEMILUNAR CARTILAGES IN MINERS : A REVIEW OF 200 CASES, WITH SPECIAL REFERENCE TO THE POST-OPERATIVE DISABILITY TIME.

A. ANDERSON BONAR, Ch.M.Glas., F.R.C.S.Edin., F.R.F.P.S.Glas.
from the Royal Infirmary Glasgow.

This paper is based on a personal series of 200 meniscectomies performed on miners, and an attempt is made to assess the results and to consider the various factors which influence post-operative disability.

Although the patients were all miners, it must be remembered that a miner's work is very variable. Some miners, for example, are engaged at the coalface 'filling'—most arduous work often carried out in narrow seams—while others are employed on 'shift work,' a wide term embracing many light jobs. It is necessary, therefore, to differentiate the various types of work performed. Reference to Table I will clarify this.

The paper is not concerned with the difficulties of diagnosis or with the operative technique, and no attempt has been made to correlate post-operative disability with the type of cartilage tear. In the series, congenital discoid cartilages and cystic external cartilages have been excluded.

Of the 200 cases, 5 men were employed on surface work ; the remaining 195 were miners in the true sense of working underground. It is clear therefore, that injuries or tears of the semilunar cartilages are essentially lesions of underground workers.

Table I shows the number of men employed underground in a large modern colliery, and the types of work are shown broadly in five groups, with the number in each group. Group I—cutters, fillers and drawers—represents the coal-face workers, and these men are subject to the greatest strains and hazards of mining. The second group work on the 'roads,' and although their work is heavy, yet they are not exposed to the dangers of the coal-face. The third group—the putters—are responsible for moving the hutches to and from the 'face,' very heavy work

requiring good physique. Only the young fit men can act as putters (see Table 7). Group 4 comprises the 'safety' men, firemen and chargemen, and usually they are older and, as one would expect, intelligent. Their work may, at times, be arduous, but generally is less so than that of the other groups. The fifth and last group is a miscellaneous collection comprising the mechanics (electrical and engineering), haulage-men, horsekeepers, onsetters, students, etc.

As is to be expected, the incidence of cartilage injuries varies with the type of work, and this is shown in Table 2.

TABLE 1.

Classification of underground workers, with the numbers employed, in a large modern colliery.

Group.	Type of Work.	Number.	Per cent.
1	Cutters, fillers, drawers	1133	42.6
2	Stonemen and packers	407	15.3
3	Putters	84	3.2
4	Firemen and chargemen	159	5.9
5	Others—Loaders, shift-workers, horse-keepers, mechanics, etc.	879	33.0
	Total	2662	100.0

TABLE 2.

Relationship between underground occupation and the incidence of cartilage injuries.

Occupation.	No.	Per cent of total employed underground.	No. of cartilage injuries.	Per cent.
Group 1	1133	42.6	141	72.3
Group 2	407	15.3	20	10.2
Group 3	84	3.2	3	1.5
Group 4	159	5.9	10	5.1
Group 5	879	33.0	21	10.9
Total	2662	100.0	195	100.0

It is striking that 72.3 per cent of all torn cartilages in underground men are sustained by Group 1—only 42.6 per cent of the total underground manpower.

Of the 200 meniscectomies, the medial cartilage was affected in 181 cases (90.5 per cent) ; the lateral in 18 cases (9.0 per cent) and both cartilages in 1 case (0.5 per cent). The incidence of tears of the lateral cartilage is in agreement with the generally accepted figure of 10.0 per cent.

The end-results in terms of working capacity is shown below in Table 3.

TABLE 3.

End-results of 200 meniscectomies in terms of working capacity.

Number returning to pre-accident work	189 (94.5 per cent)
Number unable to resume pre-accident work	11 (5.5 per cent)
	200 (100 per cent)

The number returning to their pre-accident work is gratifying, but, in some ways, the 11 cases unable to resume their work are of more interest. These cases are discussed later. The question of the influence of age in the causation of torn cartilages is of some interest, and the incidence according to age groups is shown in the following table.

TABLE 4.

Incidence of torn cartilages according to age groups.

Age Group.	Number of Torn Cartilages.	Per cent of Total.
15 - 25	24	12.0
26 - 35	83	41.5
36 - 45	63	31.5
46 - 55	28	14.0
56 -	2	1.0
Total	200	100.0

These figures (Table 4) do not suggest that the ageing miner becomes more prone to cartilage injuries.

It was shown in Table 3 that 189 cases out of 200 returned to full work. Table 5 gives the average disability period of these cases.

The unexpected finding in Table 5 is the relatively short average disability period of the lateral meniscectomy group. It is generally agreed that the disability after lateral is greater than after medial

TABLE 5.
Average disability period of 189 meniscectomies, all returning to pre-accident work.

Group.	Total disability time after operation. (days).	Average. (days).
Medial 171	14,591	85.3
Lateral 17	1,399	82.1
Bilateral 1	197	197.0
Total 189	16,187	85.6

meniscectomy (Adamson, 1946), and I can only suggest that the small number of lateral cases in my series (17) may have given an unreliable figure. The figure for the medial cases (85.3 days) compares favourably with figures published by other observers. Duthie and McLeod (1943) found that 82 days was the average disability in their series. Terhune *et al.* (1943) give the remarkably low figure of 50 days, and Bristow (1935) states that a patient should be fit for games in 42 to 56 days. But it must be stressed that mining demands a fairly complete degree of recovery, and it is therefore not to be expected that figures for miners would be low. Two cases were fit to resume work after 36 days. One was a mining student, and no doubt he was in a position to take things easily. The other was a stoneman of 38, and his indeed is a remarkable recovery. By way of contrast, one man resumed light work after 90 days, but it took 613 days before he returned to his full work! (See Table 9 and comments.)

It is to be expected that a young miner will make a quicker recovery than an old one, and this is borne out by the figures in Table 6.

TABLE 6.
Average disability period according to age groups of 189 meniscectomies returning to pre-accident work.

Age group.	Number.	Days idle.	Average.
15 - 25	23	1759	76.4
26 - 35	83	6464	77.7
36 - 45	59	5298	89.7
46 - 55	22	2550	115.9
56 -	2	193	96.5

The influence of age is further considered in Tables 7 and 8.

TABLE 7.
Classification of underground workers in age-groups.

Group.	Age-groups.					Total.
	15/25	26/35	36/45	46/55	55/	
1 Faceworkers.	205	277	340	220	91	1133
2 Puffers.	82	2	—	—	—	84
3 Stonemen.	39	78	130	75	85	407
4 Firemen, Chargemen.	—	28	41	50	40	159
5 Others.	345	107	120	139	168	879

TABLE 8.

Table showing the numbers of torn cartilages in the different work groups, and the relation to the age sub-group. The average disability is also shown.

Group.		Age-groups.				
		15/25	26/35	36/45	46/55	55/
1	No. Employed	205	277	340	220	91
	No. of T.Cs.	12	65	38	14	1
	Average Disy.	76.7	84.8	85.7	142.5	119
2	No. Employed	82	2	—	—	—
	No. of T.Cs.	3	—	—	—	—
	Average Disy.	70.0	—	—	—	—
3	No. Employed	39	78	130	75	85
	No. of T.Cs.	1	6	8	5	—
	Average Disy.	76.0	101.5	97.2	63.8	—
4	No. Employed	0	28	41	50	40
	No. of T.Cs.	—	2	5	2	1
	Average Disy.	—	51.5	69.4	58.5	74.0
5	No. Employed	345	107	120	139	168
	No. of T.Cs.	4	8	8	1	—
	Average Disy.	79.7	66.0	98.6	117.0	—

Table 7 shows the ages of the various underground workers, and in Table 8 the relationship between age and disability is clearly demonstrated.

Returning to Table 8, it is noticeable that the disability figures in Group 4 are surprisingly small. There are few cases, of course, yet if one considers that the men in the group are much older than those in Group 5, then the results are the more commendable. As a class, firemen and chargemen are intelligent and very co-operative in treatment, and this no doubt helps towards a quick recovery. But it must be admitted that their work allows them to 'nurse' the injured knee in a way not possible for a filler. It is also surprising to note how little Groups 1 and 5 differ in disability time. It is natural to think that the arduous nature of coal-face work (Group 1) would necessitate a longer hardening process than that required for a shift-worker. It is not easy to explain these findings, but the following reasons are suggested:—The coal-face worker is a piece-rate man, and he can earn a very high wage. Compensation is therefore no attraction to him. Many face workers work in teams, and they have a great sense of loyalty. As a result, a man will not resume work if he thinks he will be a hindrance to his mates; but, if he does return to work not completely fit, his mates will help him out. It is admitted that assessment of these factors is difficult, but, having worked among miners for a considerable time, I know that they are of some importance.

It is often suggested in industrial medical circles that a period of light work is of great help in restoring an injured man to fitness, and I agree fully with that opinion. Certainly there is no industry in which it is of more importance than the coal trade. But from the point of view of length of disability, the benefits are not so obvious.

TABLE 9.

The comparative average disability times between men returning at once to full work and those men who had a period of light work.

	Number.	Total Disability Time (days).	Average Disability Time (days).
Men who had a period of light work	71	8249	116.1
Men who returned at once to full work	118	8015	67.9

It would appear from Table 9 that a period of light work, instead of hastening recovery, actually delays. That conclusion is probably wrong.

There are several considerations to be borne in mind. Firstly, there is a tendency for the lazier type of man to ask for light work ; secondly, after a man recovering from an injury has become settled into a light job, there is a natural hesitation to risk going back to full work ; thirdly, there must be selection of cases, as the good recoveries will go to full work, whereas the men making an indifferent recovery, whether because of faults in the patient or surgeon, will be advised to take a light job.

It is commonly believed that a torn cartilage tends to cause degenerative changes in the knee joint, and therefore operation should not be delayed after the diagnosis is made. Smillie (1946) stresses this point, and also emphasizes that a torn cartilage aggravates a pre-existing arthritis. One would expect, then, that a long delay between accident and operation would prejudice the end-result. With this thought in mind, I classified the cases into groups according to the time elapsing between injury and operation, and related these groups to the average disability. This is shown in Table 10 below.

TABLE 10.

The relationship between the time from accident to operation (A.O. Time) and the disability period.

A.O. Time (days).	No.	Total Disability (days).	Average (days).
0 - 30 days	114	10,096	88.5
31 - 60 days	48	3,926	81.7
61 - 90 days	10	850	85.0
91 - 120 days	12	1,031	85.9
121 - 150 days	5	361	72.2

The results are surprising. It would appear that a delay of up to six months has no appreciable effect on the recovery rate after operation. These figures, of course, do not exclude the possibility of a different result if a torn cartilage has been harboured for a year or more. Adamson (1946) published figures in agreement with mine, but others (Terhune *et al.*, 1943) have recorded different findings.

Osteo-arthritis of the knee-joint is such a common finding in miners that one is apt to forget that it is a pathological change. Smillie (1946), also struck by the frequency of arthritis in miners, has coined the name 'Over-use arthritis'—an indication of the fact that the hard wear and tear of joints is partly responsible for the degenerative changes. Routine x-ray examination of knee-joints, before a cartilage operation is undertaken, reveals a degree of osteo-arthritic change in fully 50 per cent of

cases and the influence that such a change has on the recovery after operation is of great moment. Experience has led most surgeons to beware of operating on a knee-joint showing gross arthritic change, and my own figures bear this out (Table II). But in joints showing only slight change, meniscectomy appears perfectly safe. Adamson (1946) and Smillie (1946) have had a similar experience, and the latter goes further in recommending meniscectomy for torn cartilage in such joints to prevent further progress of the arthritis.

The border line cases, that is those joints showing a moderate degree of arthritic change, are difficult problems. Many of these cases make a slow recovery after operation, and the restoration of the quadriceps is a difficult task for the physio-therapist. The progression of exercises after operation has to be carefully watched, as these joints are readily disturbed and develop an effusion if over exercised. The importance of non-weight bearing exercises cannot be emphasized enough in this type of case.

Where the osteo-arthritis is advanced, the decision for or against operation is one of great difficulty. Naturally, where the diagnosis of torn cartilage is clear, and when repeated locking is causing much annoyance, the temptation to go ahead and remove the cartilage is strong. If the arthritis is unilateral, and the torn cartilage is on the same side of the joint, then possibly operation is justified. But, where the arthritic change is generalised, my experience is that meniscectomy leads to a

TABLE II.

The radiological and clinical findings in eleven cases of meniscectomy who were permanently partially disabled.

Age.	Occpn.	Cartilage.	X-ray.	Probable cause of the disability.
49	Drawer.	Medial.	O.A.	Gross osteo-arthritis.
24	Cutter.	Medial.	Nil.	Associated ligamentous injury.
39	Filler.	Medial.	O.A.	Gross osteo-arthritis.
50	Filler.	Medial.	O.A.	„ „
44	Filler.	Medial.	O.A.	„ „
53	Filler.	Medial.	O.A.	„ „
51	Cutter.	Medial.	O.A.	Osteo-arthritis and cruciate injury.
53	Drawer.	Medial.	O.A.	Osteo-arthritis.
51	Stoneman.	Medial.	O.A.	Osteo-arthritis.
39	Filler.	Medial.	Nil.	Cruciate and medial collateral ligament injury.
37	Drawer.	Medial.	Nil.	Cruciate injury.

protracted unsatisfactory convalescence, with ultimate permanent partial disability. Age must, of course, be taken into consideration, and I would suggest that any miner of 45 or over, with a severe degree of osteoarthritis, should avoid meniscectomy. In this connection, it is of interest to examine the cases which remained permanently partially or totally disabled. These are tabulated (Table 11).

It is seen that, of the eleven cases, 8 showed a severe degree of osteoarthritis, and of these 6 were aged 45 or over. The younger men who were permanently disabled are mostly accounted for by the gravity of the knee injury. They presented symptoms and signs of gross instability of the knee, consistent with a rupture of the cruciate and medial collateral ligaments. In none of these cases was operative repair attempted.

SUMMARY.

A review of 200 meniscectomies in miners is presented, and the various factors influencing the post-operative disability period are discussed.

The greatest single factor affecting the disability period is age.

A delay of up to six months between injury and operation has no obvious influence on the disability time.

The disability period is not significantly affected by the nature of the individual miner's work.

The results of meniscectomy in a joint the seat of severe osteoarthritis are very discouraging. Minor degrees of arthritic change are not a contra-indication to operation.

ACKNOWLEDGEMENT.

I acknowledge with pleasure much helpful advice given by Mr. John Dunbar.

REFERENCES.

- Adamson, W. A. D. (1946). *Edinb. med. J.* 43 : 1
Bristow, W. R. (1935). *J. Bone and Joint Surg.* 17 : 605
Duthie, J. J. R. & McLeod, J. G. (1943). *Lancet.* 1 : 197
Smillie, I. S. (1946). *Injuries of the Knee Joint.* Edinburgh : Livingstone
Terhune, S. R. *et. al.* (1943). *J. Bone and Joint Surg.* 25 : 663