

ON LUMBAR FACETECTOMIES

BY

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From 1939 to August 1947, laminectomy has been performed at this Orthopedic Clinic on 798 cases of sciatica, for removal of a ruptured intervertebral disc. In 610 cases (76 %) disc herniation was found at operation, but in 188 cases (24 %) exploration was negative. (Table 1.)

TABLE 1

Date of Operation (Year)	Total Cases Operated upon	Cases with Removal of Herniated Disc.	Cases with Laminectomy alone	Percentage of Cases with Negative Operative Findings
1939	22	18	4	18
1940	40	30	10	25
1941	41	36	5	12
1942	122	88	34	28
1943	129	96	33	26
1944	117	86	31	27
1945	125	92	33	26
1946	132	105	27	20
1947	70	59	11	16
till August 22, 1947.				
Total	798	610	188	24

Total of cases operated for sciatica over the years 1939-1947 (up to and including Aug. 22, 1947).

During the years 1942-45: 26-28 per cent negative findings. Before 1942 the cases are too few for fair comparison. Myelography consequently carried out in all cases during and after 1946 has secured a decrease in the proportion of negative explorations.

Consequently, during the last 2 years of the series, we have adopted routine pre-operative myelography, using abrodil as the contrast medium, and the incidence of negative explorations has been reduced. Table 1 shows that from 1942 to 1945 the proportion of negative explorations remained fairly constant (26-28 %), while in 1946 and 1947 it was noticeably reduced.

However, in spite of accurate clinical examination, myelography, and adequate surgical exploration, one still has to consider the possibility of negative findings at operation.

Exposure of the wrong intervertebral space should be classed as an avoidable mistake. In negative cases we explore both L4-5 and L5-S1 routinely, and sometimes, on special indications exploration is extended higher up.

In some cases at operation a prolapse in the explored disc can be seen to glide slightly backwards, if the lumbar spine is kept in lordosis; in others the prolapse becomes noticeable in kyphosis.

Disc degeneration, which is always detectable in cases of disc prolapse, may lead to a labile condition with transient nerve root compression. There may be a localized protrusion of the disc, when only a minor rupture of the annulus fibrosus exists

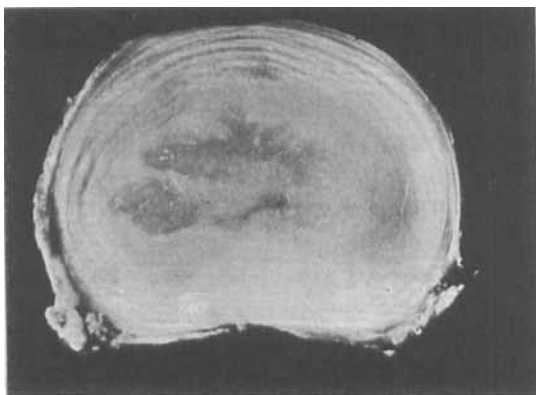


Fig. 1.
Normal disc.



Fig. 2.

The disc is fibrotic and some fragmented layers of the annulus fibrosus can be seen. Herniation about to occur laterally.

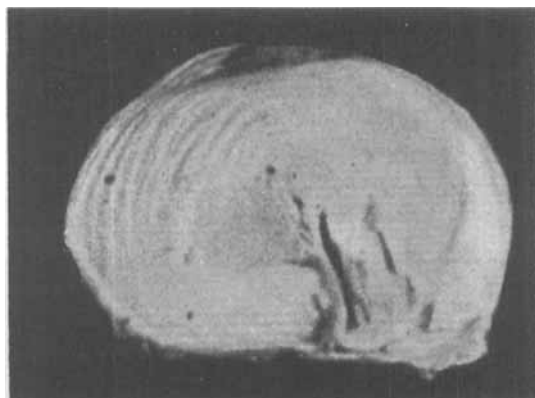


Fig. 3.

Concealed disc prolapse (lateral).

and not all the fibres are completely torn. Examination of sections made by Friberg and the author have supported this assumption. (Figs. 2 and 3.)

Thus, even where there is no palpable herniation one may be justified in incising the disc substance in order to exclude the possibility of a so-called 'concealed' disc-prolapse.

Several authors have emphasised that compression on the nerve root can occur in the region of the intervertebral foramen, and many investigators of considerable clinical experience, e.g. *Mirter* (1941) have shown the importance of this observation. Both *Lindblom* and *Friberg* reached the same conclusion from their anatomical examinations, and *Lindblom* has, in several publications from 1941-6, drawn attention to the frequency of lateral prolapses. *Friberg* showed that compression might be due partly to changes in the intervertebral joints and partly to disc prolapses in the same region.

The present author has termed the more lateral prolapses 'subarticular'. If prolapse occurs at an intervertebral joint in the lower lumbar region it may press either on the nerve root that crosses the medial aspect of the joint, or on the root which passes lateral to it—in the latter case by extension into the intervertebral foramen. In some cases both nerve roots may be affected.

The incidence of subarticular prolapses makes correct clinical diagnosis of the level of the lesion more difficult, and several factors have to be taken into account before making the diagnosis.

1. Usually each nerve root supplies a definite area, but precise delimitation cannot be demonstrated and a certain degree of overlapping may occur.
2. Involvement of only one root is essential for a clear diagnosis; but more than one prolapse at different levels may occur, and one prolapse may compress or stretch several nerve roots. One root, e.g. the 5th lumbar, can be compressed in two spaces, medially at the 4th space and laterally at the 5th.
3. The intervertebral disc above the sacrum is not in all cases the 5th lumbar junction.

Norlén's investigations have made more certain the assessment of the neurological features, but the present methods of clinical examination are not yet absolutely reliable. (*Barr*).

All our patients with sciatic symptoms now have abrodil

myelography before operation. We could find no disadvantage from this procedure in a series over 600 cases and we consider that a case of sciatica is not sufficiently investigated for operation without it. Myelography with a contrast medium shows certain features which considerably reduce the chance of negative operative findings (including all intrinsic defects of the spinal column) and in positive cases it outlines the area to which operation should be directed.

Not infrequently myelography is negative in spite of more or less striking neurological disturbances. Should the sciatica in these cases be attributed to rupture of an intervertebral disc, and if so how can one locate the process and determine its relation to the clinical picture?

It is known that at the lumbosacral space the subdural sac is not very close to the intervertebral disc, and myelography may therefore not detect the smaller prolapses, at the lumbosacral level. Therefore, in some cases one must resort to exploration in spite of negative myelography.

Further, cases occur which have characteristic neurological symptoms, but in which both myelography and operation have been negative. In such cases the clinical picture may be referable to subarticular herniation. Such a lateral prolapse at an intervertebral joint in the lower lumbar region may compress from the side either the nerve root that crosses it medially, or the more lateral root in the foramen. In both cases the negative myelogram must be explained by the absence of sheaths round the nerve roots at this level, which thus fail to be outlined by the contrast medium. In such cases unsuccessful exploration of the lower intervertebral discs should be followed by resection of the intervertebral joints to exclude the possibility of any prolapse.

There is relatively little literature on facetectomy, i.e. resection of the intervertebral joints. In 1925 *Danforth* and *Wilson* called attention to the disproportion in size between the 5th lumbar nerve root and the lumbosacral intervertebral foramen. In their report, which was based on both clinical and anatomical investigations, the authors concluded that the reduced size of

the foramen was the result of pathological changes in the lumbosacral intervertebral joint. *Putti* in 1927 recommended resection of the articular facets in those cases of sciatica which might be attributed to arthritic changes in the intervertebral joints. *Ghormly* (1931) and *Williams* (1932) stressed the importance of the facet syndrome and recommended surgical treatment in certain cases. *Williams* and *Yglesias* (1933) reported favourable results from facetectomy in sciatica and *Mitchell* (1934) described one case where facetectomy was combined with lumbosacral fusion which completely relieved the patient's pain. In 1945 *Briggs* and *Krause* published end-results of 35 facetectomies: they used the term 'intervertebral foraminotomy'. In 22 of their cases they found a diminished lumen of the foramen, secondary to narrowing of the intervertebral disc; in 7 there was hypertrophic lipping of the posterior border of the vertebral bodies; and in 6 there was herniation of the disc into the foramen. The operation was completed with spinal fusion. Postoperative follow-up varied from 3 months to 4 years. All except 3 patients were free from sciatic pain.

At this Orthopedic Clinic facetectomy has been used in 23 cases during the years 1945-6. No subsequent fusion was done as we considered that there was no definite evidence against facetectomy alone. We therefore decided to reserve spinal fusion until the patient complained of discomfort and pain.

It is now 2 years since the first operation in this series was performed (*Friberg* had already used facetectomy in 3 unpublished cases). Each case has been admitted to our Clinic for follow-up examination. (Table 2.)

Table 2 summarises the series. 17 males, and 6 females have been operated on. The patient's age at operation varied from 22-47 years. All cases had had conservative treatment before operation; all but 2 cases had worn a plaster jacket for at least a month. Most of the patients had a long history of intractable sciatic pain, which had seriously incapacitated them at their work.

20 of the 23 cases showed specific neurological disturbances before operation. 17 had negative myelograms.

TABLE

Case	Sex	Age at Operation	Duration of Sciatica before Operation (in months)	Duration of Conservative Treatment (Jacket) (in months)	Objective Preoperative Clinical Findings					
					Laségue Test		Ankle Jerk		Hypaesthesia (Areas Involved)	Paresis
					right	left	right	left		
1	M	47	10	2	45	—	—	+	n.a.d.	right great toe
2	M	27	2	—	30	—	—	+	n.a.d.	—
3	M	33	18	18	—	45	+	—	n.a.d.	—
4	F	36	28	28	—	45	+	—	n.a.d.	left great toe
5	M	29	6	3	75	60	+	—	Later, asp. ectleftfoot	left great toe
6	F	39	3	1	—	20	+	—	later, left foot	left great toe
7	M	24	72	3	30	—	+	+	n.a.d.	—
8	M	33	20	+	60	30	+	—	n.a.d.	—
9	F	30	8	2	30	60	—	+	lat. right foot	right great toe
10	M	28	14	1	45	—	—	+	n.a.d.	—
11	M	39	48	2	60	80	—	—	lat. right foot	—
12	M	33	15	3	60	—	—	+	n.a.d.	—
13	F	34	84 !	84 !	45	60	—	+	lat. right foot	—
14	M	29	16	+	—	70	+	+	n.a.d.	left great toe
15	M	27	12	7	70	70	+	+	n.a.d.	—
16	M	30	11	6	75	75	+	+	lat. left foot	left great toe
17	M	40	4	1	80	70	+	—	n.a.d.	—
18	F	39	5	2	40	40	+	+	n.a.d.	left great toe
19	M	43	6	3	—	70	left patellar reflex absent		frontal aspect left leg, entire right foot	left quadriceps all toes right foot
20	M	33	45	2+	30	40	+	+	n.a.d.	—
21	M	21	15	5	80	70	+	+	lat. left foot	left great toe
22	M	39	4	1	—	60	+	+	n.a.d.	—
23	F	22	36	—	90	80	+	—	n.a.d.	—

¹ no abnormality detected.

2

Roentgenologically Verified Degeneration Discs Interverted in Disc No:	Myelographic Location of Prolapse in Disc No:	Operation		Disc Prolapse (Operative Verification)	Pressure upon Nerve Root:	Duration of Postoperative Follow-up Months	Remaining Pain		Degree of Improvement Stated by Patient	Medial M Lateral L Sub-artic. S Prolapse
		Total Facetomy	Partial Facetomy				Back	Leg		
0	L5		L5-S1	0	—	20	—	—	well	
L3+L5	L5		L5-S1	+	S1	20	—	—	well	M
0	L4		L4-L5	+	L5	19	+	+	slight	M
0	0		L5-S1	+	S1	19	—	—	well	S M
0	0		L5-S1	+	S1	19	—	+	well	S M
0	L5		L5-S1	+	S1	19	+	+	none	S M
0	L4		L4-L5	+	L5	5	—	—	well	M
0	0		L5-S1	+	S1	18	—	—	well	S M
0	L5		L5-S1	+	S1	18	—	—	well	S M
L4	0		L5-S1	+	S1	16	—	—	well	S M
0	0		L5-S1	0	—	16	+	+	none	—
0	0		L5-S1	0	—	14	—	—	well	+ rhi-
L5	0		L5-S1	0	—	13	+	+	none	zotomy
0	0		L5-S1	+	L5	12	+	+	well	S L
L3	0		L5-S1	+	S1	12	—	+	well	S M
0	0		L5-S1	+	L5	10	+	+	none	S L
0	0		L5-S1	+	S1	9	+	+	none	S M
L4	0		L5-S1	0	—	9	+	+	well	—
L4	0	L4-L5		+	L4	8	—	—	well	S L
0	0	L5-S1		0	—	8	+	+	none	—
0	0		L4-L5	+	L4-L5	8	—	—	well	S M — L
0	0	L5-S1		osteophytes	L5 ?	7	—	—	well	—
L5	0	L5-S1		"	S1	5	+	+	well	—

Facetectomy was performed in 4 cases between the 4th and 5th lumbar vertebrae. One of these cases showed compression of the 4th lumbar nerve root, and in another a large prolapse compressed both the 4th and 5th lumbar roots. In the 2 remaining cases at this level the more usual type of midline prolapse was found. 19 operations were confined to the lumbosacral space.

Total facetectomy, i.e. complete resection of an intervertebral joint was used in 4 cases, and partial resection in the remainder. Prolapsed disc were found in 15 cases, in 12 the prolapse was subarticular, medial in 8 cases and lateral in 4. 2 explorations showed compression of the nerve root by osteophytes.

The follow-up period ranges from 5-20 months and in 14 cases it was over 12 months.

Table 3 shows the results: 11 patients are completely free from pain, and 16 are able to work. (Table 3.)

TABLE 3

Number of operations	Patients free from pain in both back and legs	Patients free from pain in back	Patients free from pain in legs	Patients enabled to work
23	11	13	11	16

Of the 12 cases with excision of a subarticular prolapse 6 are free from pain, and 9 are able to work. (Table 4.)

TABLE 4

Number of subarticular prolapses excised	Patients free from pain in both back and legs	Patients free from pain in back	Patients free from pain in legs	Patients enabled to work
12	6	8	6	9

The investigation has shown the results to be very disappointing. Many patients had complete relief of pain *immediately*

after operation, and this can be considered as a typical and striking result. But some months later identical complaints, i.e. increasing low back pain with sciatic radiation appeared. Possibly scar tissue at the site of the facetectomy caused mechanical changes and consequent pressure on the nerve root. It is worth pointing out that 3 of the 4 cases who had total facetectomy are completely cured and free from pain, which suggests that secondary changes do occur after partial facetectomy in the operated joints. These changes would explain both the backache and the root irritation.

One may also assume that the particular condition of the diseased intervertebral disc itself plays a part in the harmful effect of some facetectomies. The degeneration of the disc must increase the tendency to instability after either complete or partial removal of an intervertebral joint, and the mechanical function of the lumbar column may thus be seriously disturbed. Therefore it is perhaps not surprising that the patient develops severe discomfort and pain.

It is difficult to decide the procedure in a negative exploration. To omit lateral exploration is to risk missing a lateral herniation, and the patient's discomfort and pain will not be relieved by an eventual fusion. While on the other hand resection of an intervertebral joint has its own disadvantages. It is probably wise to recommend facetectomy combined with spinal fusion as the operation of choice.

SUMMARY

The author reports 23 cases of lumbar facetectomy without spinal fusion. Specific neurological signs were present before operation in 20 cases. Myelography was negative in 17 cases. In 15 cases detectable disc prolapses were excised, in 2 the nerve root compression was found to be due to osteophytes. 12 of the herniated discs were subarticular.

The postoperative follow-up period varied from 5 to 22 months, and in 14 cases it was over 12 months.

11 of the 23 cases complained of neither low back nor sciatic symptoms. Of the 12 subarticular cases 6 were entirely relieved and 9 were able to work.

Facetectomy is a risky interference. On the other hand failure to look for a subarticular prolapse before spinal fusion may result in burial of a prolapsed disc, and this may be considered one of the causes of longstanding pain and discomfort. In conclusion the author considers that a more radical treatment, i.e. facetectomy with subsequent fusion is the treatment of choice.

ZUSAMMENFASSUNG

Verf. beschreibt 23 Fälle von lumbaler Facetectomie, operiert ohne Kombination mit Fusion. 20 von den 23 Patienten hatten vor der Operation neurologische Fortfallsymptome. In 17 Fällen war das Myelogramm neg. Bei 15 Patienten wurden Diskushernien entfernt; in 2 Fällen machte man die Beobachtung, dass die Wurzelkompression durch Osteophyten bedingt war. 12 der Zwischenwirbelscheibenbrüche lagen subartikulär. 4 der Operationen wurden zwischen L4-L5 durchgeführt, 19 lumbosakral.

Die Observationszeit nach der Operation war höchstens 20 Monate, mindestens 5 Monate. Bei 14 Patienten war bei der Nachkontrolle mehr als 1 Jahr vergangen.

Von den 23 Operierten waren 11 schmerzfrei im Rücken und in den Beinen. 16 waren arbeitsfähig. Von den 12 subartikulären Zwischenwirbelscheibenbrüchen waren 6 vollkommen wiederhergestellt, 9 waren arbeitsfähig.

Facetectomie ist ein riskanter Eingriff. Eine subartikuläre Exploration zu unterlassen und nur eine Fusion vorzunehmen, kann dazu führen, dass man einen Prolaps begräbt, welcher dem Patienten langwierige od. ständige Beschwerden geben kann. Verf. kommt zu dem Schlusssatz, dass es wahrscheinlich besser ist, radikal zu sein, d.h. Facetectomie, samt darauffolgender Fusion durchzuführen.

RÉSUMÉ

L'auteur rend compte de 23 cas de facetectomie lombaire opérés sans combinaison avec une fusion. 20 des 23 patients présentaient avant l'opération des symptômes neurologiques spécifiques. Le myélogramme était négatif dans 17 cas. Chez 15 patients, on extirpa des hernies discales, alors que l'on constata que chez 2 autres, la compression était causée par des ostéophytes. 12 des hernies du disque avaient une localisation subarticulaire. 4 des opérations furent exécutées entre L4—L5, 19 dans l'espace lombo-sacral. Le temps d'observation fut de 20 mois au plus, de 5 mois au moins. Chez 14 patients plus d'un an s'était écoulé avant qu'on n'entreprît le nouveau contrôle.

11 parmi les 23 cas opérés étaient exempts de douleurs et dans le dos et dans les extrémités inférieures. 16 étaient capables de travailler. 6 des 12 hernies subarticulaires étaient totalement rétablies, 9 de ces patients étant capables de travailler.

La facetectomie est une intervention hasardeuse. A ne pas entreprendre une exploration subarticulaire, et, s'en tenir à une fusion uniquement, peut entraîner que l'on enterre une hernie du disque, laquelle pourra donner au patient des troubles opiniâtres ou persistants. L'auteur arrive à la conclusion qu'il vaut probablement mieux d'être radical, c.à.d. de pratiquer une facetectomie suivie d'une fusion ultérieure.

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