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Recurrence of Backache Following Discectomy: An Analysis of Management

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ABSTRACT

Background Data: Intervertebral disc prolapse, being one of the most common spine problems in the industrialized world, has a lot of medical, social, legal, and economic implications following the recurrence of pain following surgery. Due to variability in the causes of the pain generators, it is hard to devise a definitive treatment plan. However, the threshold for conservative and surgical management needs to be understood.

Purpose: The study was conducted to find out the causes for recurrence of backache following lumbar discectomy and to evaluate the effect of conservative management. The number of patients requiring a second surgery, the causes, and the effects of the second surgery on the patients were analyzed.

Study Design: Observational analytic prospective study

Patients and Methods: Thirty-one consecutive patients who presented with recurrence or persistence of backache between September 2016 and September 2017 following lumbar discectomy at our centre were evaluated. These patients were examined clinically and underwent evaluation in the form of blood investigations, plain radiographs, and MRI (Magnetic Resonance Imaging) as per protocol and further management was decided accordingly. Patients who underwent surgical and conservative management were followed up separately at of 1, 6, and 12 months and evaluated using SLR (Straight Leg Raising), ODI (Oswestry Disability Index), and VAS (Visual Analogue score).

Results: Patients were in the age range of 28–66 years and the male/female ratio was 1.8:1. The operated level that presented most with recurrence was L4-L5. Repeat prolapse was the most common cause of recurrence. Twenty-three out of 31 patients responded to conservative management and 8 patients required surgery. The mean SLR, VAS, and ODI scores improved significantly by conservative methods. Furthermore, these scores improved significantly by surgery, but the rate and the sustenance of improvement varied in the two groups.

Conclusion: Most of the patients responded well to conservative management following recurrence except for cases who had absolute indications for surgery such as infection, pseudomeningocele, or re-herniation with severe compression. The common causes of recurrence of symptoms varied according to the primary surgery done (laminectomy/fenestration). Outcomes of both conservative and surgical management were good at the end of 1 year. (2020ESJ206)

Keywords: Recurrent backache; Backache following discectomy; Failed back surgery; lumbar spine

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INTRODUCTION

Despite the progress in the treatment of degenerative disc disease, problems regarding the recurrence of pain with or without radiculopathy after surgical nerve decompression account to be about 10–40%.[2] Mixter[20] demonstrated that rupture of the intervertebral disc into the spinal canal causes sciatica; from then on, operative removal of the fragment has been considered. Barr reported a case of an operated patient having persistent low back pain and sciatica despite the surgical intervention.[1] Studies done by Weber[28] and Peul et al.[24] showed that although operated patients improved rapidly in the short term, long-term results were essentially the same as those of conservative management.

Persistent or recurrent axial and/or radicular pain, mainly in the region of the lower back and legs, even after one or more technically, anatomically successful lumbosacral spine surgeries, is called Failed Back Syndrome[6,13]; this diagnosis is established when the results of the surgery do not meet the expectations of the patient and the surgeon. Success rates after a second spine have been reported to be 30%, which dropped to 15% after the third surgery and to 5% after the fourth.[12,16] Recurrence is the reappearance of the symptoms (back pain ± radiculopathy) that existed before the surgery either in the same or in different intensity. Onset is considered early when pain or symptoms recur within 2 to 3 weeks; intermediate, within 1 to 6 months; late, after 6 months of acceptable pain relief after surgery.[10] Other than pain, the usual symptoms are as follows: restricted back mobility and flexibility, back spasms, and anxiety and depression. It does not have one specific treatment as it does not have one specific cause.[18]

Spine surgery cannot directly cure the pain but only changes the anatomy of the spine that is the probable cause of pain. In an operated spine, the causes of recurrence vary based on the structures involved. Preoperatively, inappropriate patient selection, inaccurate diagnosis, and incorrect surgical plan are important factors. Intraoperatively, surgical technique and complications during the surgery such as injury to the nerve root, operation at a wrong level, or inadequate surgical decompression could be responsible. Postoperatively, epidural fibrosis, arachnoiditis, disc space infection, pseudomeningocele, re-herniation, facet joint degeneration, instability, and myofascial pain could be the cause.[2,9,15] However, with a low threshold for surgical decision, many of these patients undergo operations again with no significant improvement from symptoms postoperatively, whereas a considerable number of them respond well to conservative management.

This study aimed to find out the common causes and demographics of the patients who presented with recurrence of symptoms following lumbar discectomy and to evaluate the effects of conservative management on them. The number of patients requiring surgery and the causes and the effects of the surgical management were also analyzed.

PATIENTS AND METHODS

Thirty-one consecutive patients who presented to our tertiary care centre between September 2016 and September 2017 with recurrence of backache with or without radiculopathy following lumbar discectomy were reported. They included 20 males and 11 females with a mean age of 45.34 ± 9.23 (range, 28–66) years. Informed consent was taken from all patients and the study was conducted after approval from the Institutional Ethics Committee (IEC 620/2016). Patients who (1) were below 20 years of age; (2) underwent the operation in other hospitals; (3) had spinal structural abnormalities or had other causes of backache such as inflammatory, preexisting spondylodiscitis, tumors, trauma, and so forth; (4) underwent primary vertebral fusion; (5) underwent intervention in the form of epidural steroids elsewhere following the recurrence of pain; (6) did not complete the follow-up were all excluded from the study.

Patients who presented with recurrence of symptoms after a period of relief, with persistence of the same symptoms that were existed prior to surgery, or with worsening of symptoms were further evaluated. All patients underwent plain radiographic evaluation of the lumbosacral spine (anteroposterior view and lateral view in flexion and extension) (Figure 1) and laboratory investigations in the form of erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) level. The degree of instability was measured on the lateral radiographic views in flexion and extension by using the criteria by Posner et al.[25]

A baseline evaluation of all patients who presented was done using SLR, ODI, and VAS scores with a detailed proforma. The protocol of testing for SLR used was the one advocated by Breig and Troup.[3] If the lab investigations were normal, ODI was between 20–40%, and there were no signs of instability, then conservative management was followed. The conservative management included bed rest, pharmacotherapy, and physiotherapy. Pharmacotherapy mainly alleviated the pain using nonsteroidal anti-inflammatory drugs as analgesics, muscle relaxants, and neurotropics.[11] Physiotherapy continued for a month and consisted of deep heat therapies, interferential therapy, and one-week intermittent lumbar traction.[19] Exercise therapy was started based on the McKenzie approach from the second month based on patients' tolerance to pain.[21] A steroid (40 mg Triamcinolone mixed with 10 ml of lignocaine) was administered epidurally in the third month to aid in the conservative management if the pain was persisting.[12,17]

If the laboratory investigations were abnormal, ODI score was above 40%, features of instability were noted on radiographs, and there was no period of relief of symptoms since surgery, new-onset weakness, recurrent fever, discharge from the surgical site. or no improvement in symptoms/scores after one month of conservative trial, then MRI of the lumbosacral spine was advised which decided the further management. If the MRI was not indicative of surgery, then the patient was continued on conservative management. The patients who underwent conservative management and those who underwent repeat surgery were followed up and assessed separately every month up to the third month and then every 3 months after that up to one year. SLR, VAS, and ODI scores were recorded in the proforma at one, six, and twelve months and the outcomes were analyzed.

Statistical Analysis

All statistical analyses were done using SPSS software, version 20.0, IBM corporation (SPSS Inc., Chicago, Illinois). The demographic descriptive statistics were reported as a mean for continuous variables. The relation of categorical variables with the type of management was analyzed by Chi-squared analysis. Repeated measures Analysis of Variance (ANOVA) was used to assess the change in SLR, ODI, and VAS scores and to evaluate the individual outcomes of conservative and surgical management over one year. p value < 0.05 was considered significant.

RESULTS

Patients were followed up for at least one year. Twenty-one patients in the study were in the age group of 40–60 years. The mean duration of presentation after index surgery with recurrence of symptoms was 36.09 ± 52.6 months where 18 patients presented within 12 months, 12 patients after 12 months, and one patient immediately after surgery with no improvement in symptoms (Table 1).

Among the patients who came back with recurrence of symptoms, L4-L5 was noted to be the most common level of disc prolapse (Figure 2) and the most common single operated level. Of the patients who presented, 16 had undergone fenestration and microdiscectomy and 15 undergone laminectomy and discectomy. This issue does not correlate statistically with the rate of recurrence among the 2 types of surgeries. Three of the 31 patients had significant instability

on the lateral radiographs and 2 of these 3 patients had undergone laminectomy and discectomy.

Of the 31 patients who presented with recurrence or persistence of symptoms, repeat prolapse was found to be the most common cause, with 6 patients having repeat prolapse at the same level and 3 at a different level diagnosed by MRI based on their symptoms that were not relieved by conservative trial (Table 2). Of these 9 patients who had true recurrent disc prolapse, the most common level was the L4-L5 level and it was noted that 7 out of these 9 patients had undergone laminectomy and discectomy and 2 had undergone fenestration and microdiscectomy. Facet joint arthropathy (N = 6) and instability (in 2 cases, N = 3) were other causes for recurrence in patients who underwent laminectomy and discectomy. Six patients with facet joint arthropathy were noted after MRI. In cases of overlap with another notable cause in the same patient, facet joint arthropathy was concluded to be the major cause of pain generator only on relief of pain after injecting a local anaesthetic to the tender point under image guidance. Three cases of instability were reported which were confirmed by the flexion-extension radiographs.

Haematoma (N = 2), retained disc (N = 1), pseudomeningocele (N = 1), and infection (N = 3) were found to be other causes for recurrence (Table 2) noted mainly in patients who underwent fenestration and microdiscectomy. These causes were confirmed by blood parameters and MRI with or without contrast, as required, based on the criteria for MRI as explained in methodology. All patients underwent X-ray as a baseline evaluation with flexion-extension views to rule out signs of instability. Twenty-three patients underwent MRI of which 12 underwent primarily as per criteria and 11 patients underwent MRI on nonrelief of symptoms after conservative trial. Eight patients required MRI with contrast. Three patients presented with infection of which one had spondylodiscitis. In 5 of the patients, the cause could not be found; however. their pain improved progressively with conservative management over 6 months.

Twenty-three out of 31 patients who presented with symptoms responded to conservative management. An epidural steroid was given to 4 patients out of whom 3 responded and one patient eventually needed surgery. Of these 4 patients, one was noted to have ligamentum flavum hypertrophy, one with epidural fibrosis and ligamentum flavum hypertrophy, and 2 patients with repeat prolapse of which 1 had no relief and ended up having laminectomy and discectomy. In total, 8 out of 31 patients required surgery, four primarily and four after conservative trial. Of these, two had an infection who underwent debridement, laminectomy, and gentamicin bead application; one had pseudomeningocele who underwent exploration and secondary suturing; three cases had repeat prolapse, one had stenosis; one had retained disc who underwent discectomy and laminectomy. One patient diagnosed with infection and abscess did not undergo the operation because of financial constraints but improved with antibiotics.

It was noted that the type of management that the patients attained relief from had no significant association with baseline characteristics such as age, sex, occupation, comorbidities, preoperative disc level, duration after primary surgery or the surgery they underwent previously, as per the Chi-squared analysis (Table 3).

At the last follow-up, the mean SLR changed from 72.05 ± 11.39 to 80.23 ± 6.75 degree in conservative management and from 62.5 ± 12.59 to 82.5 ± 4.63 in surgical management. VAS scores changed from 7.63 ± 0.42 to 5.31 ± 0.79 in conservative management and from 8.06 ± 0.82 to 4.3 ± 0.47 in surgical management. ODI scores changed from 39.09 ± 2.27 to 28.50 ± 3.49 in conservative methods and from 41.63 ± 2.13 to 24.5 ± 1.51 in surgical management. Mean and standard deviation were calculated and testing of assumptions for ANOVA was done (Tables 4 and 5). The improvement in VAS and ODI scores over one year was noted in conservative and operative

management (Figures 3 and 4). It was noted that the improvement in VAS, ODI, and SLR in both groups were good after one year (Table 4). In cases which required surgery, the improvement in these parameters was the most in the first month and it had a sustained improvement up to one year. In cases which were managed conservatively, there was a steady rate of improvement in VAS, ODI, and SLR up to 6 months after which it plateaued out.

Table 1. Causes for recurrence of symptoms according to duration.

Duration of presentation	Causes	Number
Immediately after surgery/ no relief	Retained disc	1
Within 12 months from index surgery	Infection Epidural fibrosis Haematoma Repeat prolapses Instability Pseudomeningocele Ligamentum flavum hypertrophy Stenosis No attributable cause	4 2 2 3 2 1 2 1 2
After 12 months from index surgery	Repeat prolapses Stenosis Instability Facet joint arthropathy Ligamentum flavum hypertrophy No attributable cause	6 3 1 6 4 3

Table 2. Cases with causes noted for recurrence or persistence of symptoms in each patient.

Causes	Total	Percentage
Repeat prolapse	9	29.03
Facet joint arthropathy	6	19.35
Ligamentum flavum hypertrophy	6	19.35
Stenosis	4	12.9
Abscess	3	9.67
Instability	3	9.67
Epidural fibrosis	2	6.45
Haematoma	2	6.45
Discitis	1	3.22
No attributable cause	5	16.12
Retained disc	1	3.22
Pseudomeningocele	1	3.22
Sacroiliitis	1	3.22
Wrong operated level	0	0

Table 3. Chi-squared association between baseline parameters and type of management that patients attained relief from.

Characteristics		Conservative		Surgical		*p* value
		Number	%	Number	%	
Age	20–29 years	1	4.3	1	12.5	0.37
	30–39 years	6	26	1	12.5	
	40–49 years	9	39.1	2	25	
	50–59 years	7	30.4	3	37.5	
	60–69 years	0	0	1	12.5	
Sex	Male	15	65.2	5	62.5	1
	Female	8	34.8	3	37.5	
Occupation	Heavy	9	39.1	3	37.5	1
	Moderate	12	52.1	5	62.5	
	Sedentary	2	8.7	0	0	
Diabetes mellitus	Yes	4	17.4	4	50	0.15
	No	19	82.6	4	50	
Preoperative disc level	L3-L4	3	13	0	0	0.23
	L4-L5	9	39.1	4	50	
	L5-S1	5	21.7	0	0	
	L3-L4, L4-L5	1	4.3	0	0	
	L4-L5, L5-S1	3	13	4	50	
	Multiple	2	8.6	0	0	
Duration from previous surgery	< 1 month	5	21.7	3	37.5	0.23
	1–6 months	4	17.4	3	37.5	
	> 6 months	14	60.9	2	25	
Surgery underwent previously	Fenestration	10	43.5	6	75	0.22
	Laminectomy	13	56.5	2	25	

Table 4. Changes in VAS, ODI, and SLR at 1-, 6-, and 12-month follow-up.

Time	VAS		ODI		SLR/degree	
	Conservative	Surgical	Conservative	Surgical	Conservative	Surgical
Postop	7.63 ± 0.42	8.06 ± 0.28	39.09 ± 2.27	41.63 ± 2.13	78.18 ± 10.97	58.75 ± 14.58
1 month	6.56 ± 0.66	6.55 ± 0.85	33.45 ± 3.43	33.75 ± 3.2	80.45 ± 10.46	72.50 ± 10.35
6 months	5.37 ± 0.73	5.21 ± 0.92	29.05 ± 2.68	28.63 ± 3.46	83.64 ± 7.27	78.75 ± 8.35
1 year	5.31 ± 0.79	4.3 ± 0.47	28.50 ± 3.49	24.5 ± 1.51	82.27 ± 6.85	82.5 ± 4.63

Table 5. Summary of repeated measures ANOVA

Parameters	Greenhouse-Geisser				
	Sum of squares	df	Mean square	F	Sig.
VAS	6.43	2.13	3.02	5.02	0.008
ODI	129.38	2.59	49.99	5.44	0.003
SLR	1220.68	2.36	518.30	11.14	0.001

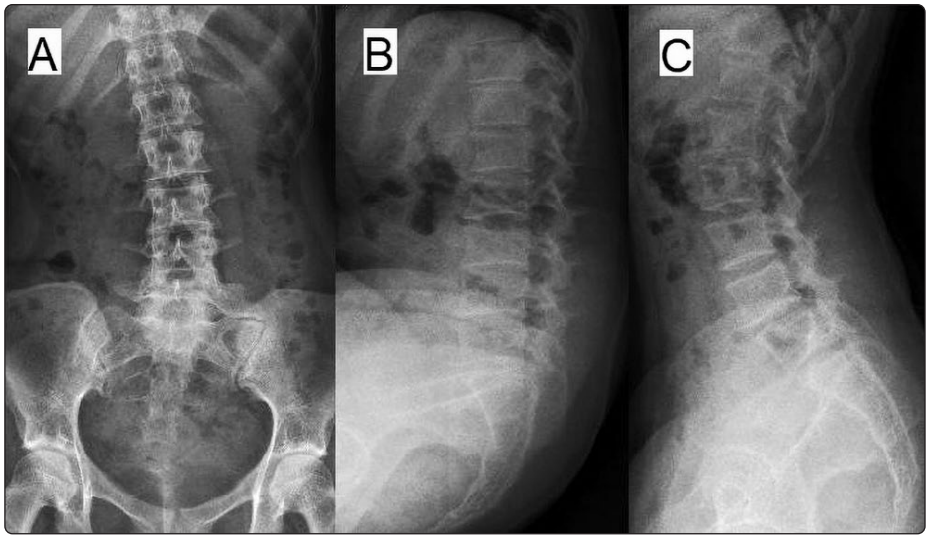

Figure 1.
Baseline X-rays done on the first visit after recurrence presentation. (A) Anteroposterior view. (B) Lateral view flexion. (C) Lateral view extension.

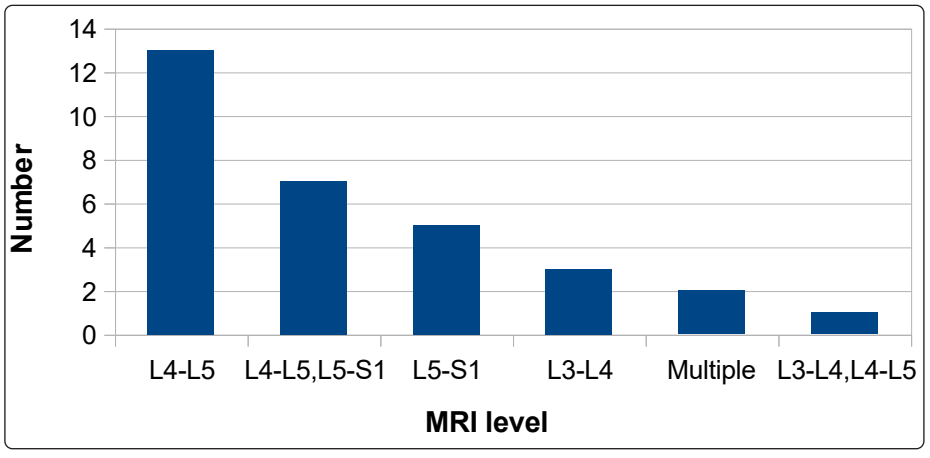

Figure 2.
Distribution of study reported preoperative disc levels.

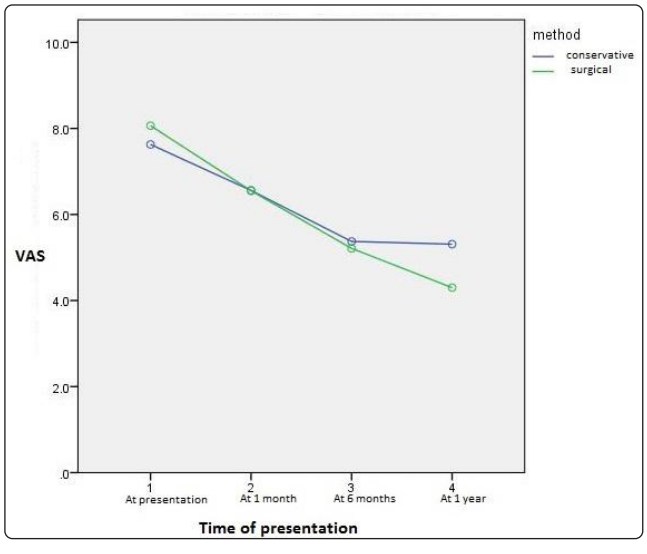

Figure 3. Outcome assessment in the conservative and surgical groups using VAS score.

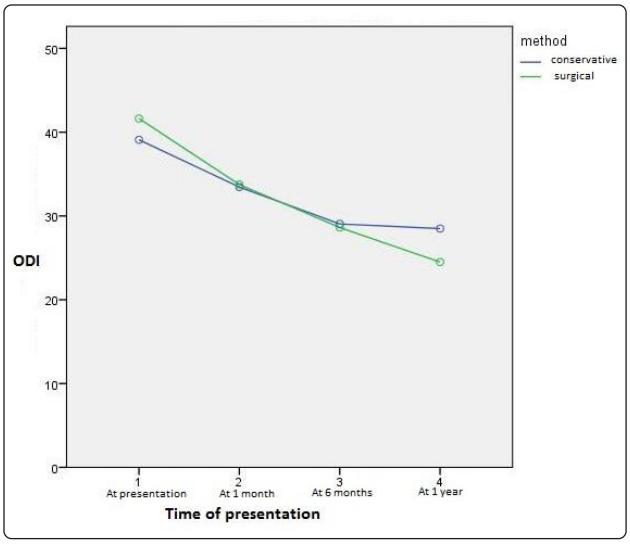

Figure 4. Outcome assessment in the conservative and surgical groups using ODI score.

DISCUSSION

Over the past several decades, two methods of disc removal have been used for open and microdiscectomy procedures. The first, described by O'Connell[22], involves an aggressive removal of the herniated disc fragment and curettage of the remaining disc. The second, described and popularized by Williams[29] and Spengler[27], emphasizes the removal of the disc fragment alone with a little invasion of the disc space. One has been associated with degenerative changes while the latter with chances of disc re-herniation.

According to the study conducted by Finnegan et al.[8], the period after discectomy in which the patient presents can assist in suspecting the cause up to some extent. Absence of any pain-free intervals usually means that the procedure did not target the lesion. As per our study, 18 patients presented with recurrence of pain within 12 months with causes being haematoma, infection, epidural fibrosis, repeat prolapse, instability, and pseudomeningocele. One patient had no relief of pain due to retained disc. Twelve patients presented after 12 months with causes such as repeat prolapse, stenosis, instability, facet joint arthropathy, and ligamentum flavum hypertrophy. Instability was noted early in 2 patients, probably due to the damage to the facet joints during surgery. L4-L5 level was noted to be the most common operated level and the most common level presenting with repeat prolapse. Biomechanically, the orientation of the lumbar spine changes at the L4-L5 and L5-S1 levels in which the majority of the movements of the lumbar spine occur. Moreover, the posterior longitudinal ligament is more deficient at these levels, making it more prone to disc prolapse.[23]

The pattern of causes for recurrence in our study is not in accordance with that of previous studies such as El-sissy et al.[7], Skaf et al.[26], or Ebeling et al.[5] This is could be because of variations in referral patterns during the period and difference in grouping categories when more than one radiological finding for the symptoms is identified. Biomechanical studies support the notion that laminectomy and increased disc disruption will accelerate degenerative disc disease and transfer axial loads radially to the innervated annulus fibrosus and the posterior column facet joint[14], thereby causing pain and making the motion segment unstable. In fenestration, the major drawback is the limited visibility. Hence, facet joint arthropathy and instability are more common in laminectomy cases, mainly in the L4-L5 level, while retained disc, infection, and pseudomeningocele are more common in microdiscectomy cases as shown in our study too.

The treatment of cases with failed back surgery syndrome has remained a matter of controversy because of multifactorial aetiology, difficulty in diagnosis of the exact cause, and varying therapeutic modalities. Pertinent literature on revision lumbar spine surgery has revealed a wide variation in success rates (23%–83%).[7,26] Revision surgery is complicated by scars, obliterated tissue planes, and distortion of presumably once normal anatomy. In the 9 cases of true recurrent disc prolapse that presented in our study (6 at the same level and 3 at a different level), the threshold for operative management was kept quite high unless there was an absolute indication for surgery such as new-onset weakness correlated with the MRI or cauda equina syndrome.[4] Of the 9 patients, 6 improved by the protocol of conservative management and 3 required surgery as the symptoms of pain and radiculopathy, that correlated with the MRI findings, persisted even after conservative trial.

It was also noted in the study that the improvement in symptoms in both conservative and surgical management was good at the end of one year. The patients who were managed conservatively showed a sustained rate of improvement up to 6 months after which it plateaued out. The surgical group, on the other hand, showed a surge of improvement in the first month after which it was sustained up to one year. This was probably due to

recruiting patients who had an absolute indication for surgery, such as infection, pseudomeningocele, or re-herniation with severe compression, which gave a better response to treatment.

One of the major limitations of this study is that recruitment of patients over a small period, that is only one year, and hence the incidence of causes for failed back surgery syndrome as well as the outcomes may show significant variations. A multicentric study with the recruitment of more patients over a longer period would give a better insight into the causes and the actual number of cases that can be conservatively managed before considering surgery.

The number of discectomies is increasing as the number of surgeons operating on the spine is also on the rise. Surgeries that do not meet the indication criteria can result in persistence or worsening of pain. Hence, high success rate highlights the importance of a precise clinical and radiological evaluation with appropriate selection of treatment with a strategically designed protocol of management.

CONCLUSION

Most of the patients responded well to conservative management after recurrence except for cases which had absolute indications for surgery such as infection, pseudomeningocele, or re-herniation with severe compression. Repeat prolapse at the same or different level was noted to be the most common cause for presentation with the most common level being L4-L5. Common causes for recurrence varied according to the primary surgery done (laminectomy and discectomy or fenestration and microdiscectomy).

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الملخص العربي

آلام الظهر المرتجعه بعد استئصال الغضروف القطني: تحليل خطه العلاج

البيانات الخلفية: يعد تدلي القرص الفقري أحد أكثر مشاكل العمود الفقري شيوعًا في العالم الصناعي ، وله الكثير من الآثار الطبية والاجتماعية والقانونية والاقتصادية بعد تكرار الألم بعد الجراحة. بسبب التباين في أسباب مسببات الألم ، من الصعب وضع خطة علاج نهائية. ومع ذلك ، يجب فهم خطه العلاج التحفظي والجراحي.

الغرض: أجريت الدراسة لمعرفة أسباب تكرار آلام الظهر بعد استئصال القرص القطني ولتقييم تأثير الإدارة المحافظة. تم تحليل عدد المرضى الذين يحتاجون لعملية جراحية ثانية وأسبابها وآثارها على المرضى.

تصميم الدراسة: دراسة مستقبلية تحليلية رصدية

المرضى والطرق: تم تقييم 31 مريضًا متتاليًا ممن تعرضوا لتكرار أو استمرار آلام الظهر بين سبتمبر 2016 وسبتمبر 2017 بعد استئصال القرص القطني في مركزنا. تم فحص هؤلاء المرضى سريريًا وخضعوا للتقييم في شكل فحوصات الدم ، والأشعة السينية ، والتصوير بالرنين المغناطيسي وفقًا للبروتوكول وتم اتخاذ قرار إضافي وفقًا لذلك. تمت متابعة المرضى الذين خضعوا للإدارة الجراحية والمحافظة بشكل منفصل في 1 و 6 و 12 شهرًا وتقييمهم باستخدام SLR (رفع الساق المستقيمة) و ODI (مؤشر الإعاقة Oswestry) و VAS (درجة التناظرية المرئية).

النتائج: كان المرضى في الفئة العمرية 28-66 سنة وكانت نسبة الذكور / الإناث 1.8: 1. كان المستوى الذي تم تشغيله الأكثر تكرارًا هو.(5/L4) كان التدلي المتكرر هو السبب الأكثر شيوعًا للتكرار. استجاب 23 من أصل 31 مريضًا للإدارة المحافظة وتطلب 8 مرضى الجراحة. تحسن متوسط درجات SLR و VAS و ODI بشكل ملحوظ بالطرق المحافظة. علاوة على ذلك ، تحسنت هذه الدرجات بشكل كبير عن طريق الجراحة ، لكن معدل التحسن وقوته تباينت في المجموعتين.

الخلاصة: استجاب معظم المرضى بشكل جيد للتدبير التحفظي بعد التكرار الغضروفي باستثناء الحالات التي لديها مؤشرات مطلقة للجراحة مثل العدوى ، أو القيلة السحائية الكاذبة ، أو الانضغاط الشديد. تباينت الأسباب الشائعة لتكرار الأعراض وفقًا للجراحة الأولية التي أجريت (استئصال الصفيحة الفقريةfenestration /). كانت نتائج كل من العلاج المحافظ والجراحي جيدة في نهاية عام واحد.