

Incidence of recurrent lumbar disc herniation: A narrative review

ABSTRACT

Background: Recurrent disc herniation is a common condition that often results in months of disabling symptoms and additional costs.

Objective: The objective of this study was to investigate the incidence of recurrent disc herniation in patients treated surgically.

Materials and Methods: Clinical trials and prospective studies involving patients treated with different techniques, such as open, percutaneous, or microendoscopic discectomy, were included. The incidence of recurrence as well as the level and the time until the recurrent disc herniation was collected.

Results: Thirteen studies were included. Recurrence of disc herniation ranged from 0% to 14% of patients. Most recurrences occurred at the same level of herniation and on the same side. The time to recurrence of disc herniation ranged from 1 to 5 years.

Conclusion: This study answers the question of how much, when, and where in lumbar recurrent disc herniation.

Keywords: Incidence, lumbar disc herniation, recurrent disc herniation, review

INTRODUCTION

Recurrence of lumbar disc herniation can be defined in different ways according to the different authors. Some authors consider that it occurs when a disc herniation appears at the same level as the primary herniation, regardless of whether it appears ipsilaterally or contralaterally, in a period of at least 6 months without pain after the first intervention.^[1,2] Some authors define it as disc herniation occurring subsequently at a different level from the primary hernia, although this is a less common definition.^[2]

Different studies demonstrate a recurrence frequency between 5% and 15%.^[3] Several studies have been carried out to demonstrate the reason for the recurrence of disc herniation. The frequency is expected to be related to the different surgical procedures.^[4] Discectomy is the most well-known technique and has different approaches such as simple one discectomy, percutaneous endoscopic discectomy that can be interlaminar, transforaminal, or even a minimally invasive transforaminal interbody fusion.^[4-8] In addition, the learning curve for specialists is closely related to recurrence.^[4]

Risk factors that have been described related to the recurrence of disc herniation include age, gender, body mass index (BMI), smoking, the presence of comorbidities such as diabetes, and the presence of particular radiological features.^[1,9] Complications after surgery, among other issues, must also be considered.^[2,9]

The objective of this study was to review the studies that address the incidence of recurrent lumbar disc herniation and to describe the demographic characteristics associated with this condition.

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MATERIALS AND METHODS

Search strategy and study selection

The search was limited to PubMed. We used the following Medical Subject Headings (MeSH): “Recurrent disc herniation and incidence.” The search was limited to English language. Inclusion criteria were: prospective cohort studies or randomized clinical trials that treat patients with different surgical techniques; studies that included at least any of the following outcomes: surgical technique and rate of recurrent disc herniation. Exclusion criteria were: studies that did not treat humans, duplicated studies, and studies that did not share variables.

Data extraction

Baseline data were collected from each study: technique, number of patients, gender, mean age, and follow-up. The incidence of recurrent disc herniation was collected, as well as the level of recurrence and time to recurrence. Incidence was measured by the number of patients with the event under study. The level of recurrence was divided into the same level (further divided into the same side and contralateral side) and different levels. Time to recurrent hernia was measured in years.

Data analysis

This review was carried out using an Excel spreadsheet (version 16.52 for IOS). For quantitative variables, the mean, standard deviation, and range of each study were used.

RESULTS

Studies description

Table 1 shows the main characteristics of the included studies.^[8,10-20] Thirteen studies were included. Six studies used conventional open discectomy as the main technique, two studies used microendoscopic discectomy, one study used percutaneous discectomy, one study used laminectomy or hemilaminectomy, one study used tubular discectomy, one study used open minidiscectomy, and one study combined three techniques (percutaneous discectomy, microendoscopic discectomy, and microdiscectomy). The sample size of the different studies ranged from 60 to 1898 patients. The percentage of male patients was 64%, although not all studies analyzed lumbar disc herniation recurrence according to gender. The age of the subjects ranged from 30 to 53 years.

Incidence, location, and time until recurrence

Table 2 shows the main results. The recurrence rate of lumbar disc herniation varied according to the employed technique: 1%–12% conventional open discectomy, 1%–10.8%

microendoscopic discectomy, 5.5%–9.6% percutaneous discectomy, 6% laminectomy, 9.5% tubular discectomy, and 9.2% open minidiscectomy. Regarding the level of recurrence, this data was not provided in all studies. Most of the studies reported recurrence at the same level. Six of the studies reported the recurrent hernia on the same side as the primary hernia, whereas Davis *et al.*, Wera *et al.*, and Matsumoto *et al.* reported recurrence at the same level but on the contralateral side. Davis *et al.*, Dalgic *et al.*, Yorimitsu *et al.*, Wu *et al.*, and Matsumoto *et al.* reported the recurrence at a different level than the primary hernia. The time after recurrence was provided by seven studies and ranged from 1 to 4.5 years.

DISCUSSION

Recurrence of lumbar disc herniation can be defined in several ways, and the most commonly accepted meaning indicates that recurrence occurs at the same level as the primary disc herniation, regardless of whether it is ipsilateral or contralateral.^[6]

The incidence of recurrence ranged from 5% to 15%. Recent systematic reviews on disc herniation recurrence focus on the evaluation of risk factors and the comparison of different surgical techniques. There are no recent systematic reviews focused on the incidence of recurrent lumbar disc herniation. The current tendency seems to support the use of less invasive techniques since they have shown satisfactory outcomes.^[21] McGirt *et al.* found that aggressive procedures resulted in a higher pain recurrence rate, whereas those who underwent less invasive procedures had a higher disc herniation recurrence rate.^[8] The surgeon, by performing less invasive techniques, has a lower visibility of the surgical site, which could leave part of the hernia remnant or iatrogenic damage to the surrounding tissues.

The current reviews on disc herniation recurrence identify potential factors that may be associated with recurrence: male gender, aging, high BMI, addictive behaviors, diabetes, disc structure, and the presence of specific radiological features.^[2,6]

Andersen *et al.* suggested that the reintervention and complication rate in patients with higher BMI are much higher than in patients with lower BMI. Limited activities such as heavy lifting or physically demanding work for a period after surgery may reduce the cases of recurrence, although there are discrepancies with early mobilization.^[22]

Regarding tobacco, it is believed to be closely related to recurrence, although the mechanisms are still unclear.

Table 1: Characteristics of the included studies

Study	Surgery	n	Males	Females	Age (years)	Follow-up (years)
Davis 1994 ^[10]	Hemilaminectomy or laminectomy	984	626	356	42.0	-
Liu <i>et al.</i> 2018 ^[11]	Percutaneous discectomy	60	31	29	36.2	-
	Microendoscopic discectomy	63	32	31	33.1	-
	Microdiscectomy	69	36	33	30.0	-
Molitero <i>et al.</i> 2010 ^[12]	Tubular discectomy	147	-	-	-	-
Carragee <i>et al.</i> 2003 ^[13]	Open discectomy	180	-	-	37.5	-
Benzakour and Benzakour 2019 ^[14]	“Miniopen” discectomy	552	362	190	36.1	14.7
McGirt <i>et al.</i> 2009 ^[8]	Open discectomy	108	72	36	41.0	2.1
Wera <i>et al.</i> 2008 ^[15]	Open discectomy	1320	-	-	-	-
Dalgic <i>et al.</i> 2016 ^[16]	Open discectomy	1898	-	-	-	-
Eun <i>et al.</i> 2016 ^[17]	Percutaneous discectomy	62	-	-	-	11.22
Yorimitsu <i>et al.</i> 2001 ^[18]	Open discectomy	72	47	25	38.0	14.3
Wu <i>et al.</i> 2006 ^[19]	Microendoscopic discectomy	873	535	338	41.5	2.3
Matsumoto <i>et al.</i> 2012 ^[20]	Microendoscopic discectomy	344	213	131	39.3	3.6

Table 2: Incidence, location and time to recurrence

Study	Surgery	Recurrence	Total	Percentage	Same level	Same side	Contralateral side	Different level	Time
Davis 1994 ^[10]	Hemilaminectomy or laminectomy	60	984	6.0	30	26	4	16	4.3
Liu <i>et al.</i> 2018 ^[11]	Percutaneous discectomy	3	55	5.5	-	-	-	-	-
	Microendoscopic discectomy	2	59	3.4	-	-	-	-	-
	Microdiscectomy	0	69	0.0	-	-	-	-	-
Molitero <i>et al.</i> 2010 ^[12]	Tubular discectomy	14	147	9.5	14	14	0	0	1.0
Carragee <i>et al.</i> 2003 ^[13]	Open discectomy	16	180	8.9	16	16	0	0	-
Benzakour and Benzakour 2019 ^[14]	“Miniopen” discectomy	51	552	9.2	14	-	-	0	1.0
McGirt <i>et al.</i> 2009 ^[8]	Open discectomy	11	108	10.2	-	-	-	-	-
Wera <i>et al.</i> 2008 ^[15]	Open discectomy	14	1320	1.0	14	6	8	0	1.0
Dalgic <i>et al.</i> 2016 ^[16]	Open discectomy	65	1898	3.4	40	-	-	25	4.5
Eun <i>et al.</i> 2016 ^[17]	Percutaneous discectomy	6	62	9.6	-	-	-	-	-
Yorimitsu <i>et al.</i> 2001 ^[18]	Open discectomy	8	72	11.1	7	-	-	1	-
Wu <i>et al.</i> 2006 ^[19]	Microendoscopic discectomy	8	873	1.0	6	-	-	2	-
Matsumoto <i>et al.</i> 2012 ^[20]	Microendoscopic discectomy	37	344	10.8	33	30	3	4	1.4

Huang *et al.*^[6] concluded that nicotine plays an important role in inhibiting oxygenation and nutrition of the annulus fibrosus of the disc, whereas Akmal *et al.*^[23] analyzed the role of nicotine and concluded that nicotine induces collagen inhibition, which could reduce the cartilaginous content of the annulus fibrosus, thus, leading to degenerative changes and traumatic lesions.

Diabetes also resulted to be a negative predictor of poor prognosis. The healing of the annulus fibrosus of diabetic patients requires a longer healing time, as they have altered physiological proteoglycan composition.^[24]

Hao *et al.* observed that patients presenting with lumbar disc herniation after percutaneous endoscopic discectomy and Modic changes showed a higher risk of recurrence since the cartilaginous endplates are affected, the junction with

the vertebral body is weak, and the herniation recurs more easily.^[9,25] In addition, Mok *et al.* correlated Modic changes with low back pain.^[26]

Here is controversy on how recurrent disc herniation should be treated. Li *et al.* recommend percutaneous endoscopic lumbar discectomy due to the satisfactory outcome.^[21] Yao *et al.* recommended that conservative treatment should be considered initially.^[27]

Some of the limitations of this review were the lack of studies dealing with techniques different than conventional open discectomy and the lack of data such as time to recurrence. Moreover, heterogeneity in the sample size of the studies made a difficult comparison. In addition, most studies included recurrence of lumbar disc herniation as a secondary outcome.

CONCLUSION

The incidence of recurrent lumbar disc herniation ranged from 0% to 15%. There were no differences between the different techniques, although most studies include conventional open discectomy as the main procedure. The location of recurrence was on the same side as the primary herniation, and the time to recurrence ranged from 1 to 5 years.

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Conflicts of interest

There are no conflicts of interest.

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