ORIGINAL ARTICLE

RECURRENT LUMBAR DISC PROLAPSE, CAUSATIVE FACTORS AND OUTCOME IN BANGLADESHI PEOPLE

Hernia del disco lumbar recurrente, factores causales y resultados en personas de Bangladesh

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ABSTRACT

Introduction: Recurrent lumbar disc prolapses (RLDP) is not uncommon after surgery. The incidence of RLDP varies from 5-18% across the different populations in the world. The exact cause of recurrence is not known but the weakness of the annular tissue due to previous surgery, exposure to repetitive lifting, heavy work causing axial load, advanced age, smoking, are some of them. RLDP can be managed conservatively, but if that fails, such cases are candidates for surgery. Various surgeries can be done- open versus minimally invasive surgeries, fusion versus non-fusion surgeries are debatable. The study aims to evaluate the causative factors of RLPD and the outcome of surgeries in Bangladeshi peoples.
Methods: A total of 126 cases of RLDP in 1800 lumbar disc surgery patients were included in the study. This study was retrospective and multicenter data were analysed from 4 private hospitals. The male-female ratio was 3:2. The study period was from 2009 to 2018. The Minimum follows up period was 1 year.
Results: There was a significant risk of RLDP in sex, smoking habit, BMI, and heavy workers. By using these differences, a logistic regression analysis showed that males, increased BMI, heavy workers, residual disc particularly under posterior longitudinal ligament, indiscipline life and smoker could predict lumbar disc herniation recurrence. Minimally invasive surgeries had better outcomes than open surgical methods. Fusion surgeries with stabilization were encouraging.
Conclusions: Patients who are male, increased BMI, heavy workers, indiscipline life and smoker could predict lumbar disc herniation recurrence. Minimally invasive surgeries under illumination have a better outcome than open surgical methods. Residual disc, particularly under posterior longitudinal ligament, is associated with a high recurrence of symptoms. Patient selection, clinical examination, investigations, and understanding the indications for surgery in recurrent cases is the key to success.
Keywords: *Lumbar, Disc, Prolapse, Recurrence (source: MeSH NML)*

RESUMEN

Introducción: La hernia o prolapso del disco lumbar recurrente (PDLR) no es infrecuente después de la cirugía. La incidencia de PDLR varía de 5 a 18% en las diferentes poblaciones del mundo. Se desconoce la causa exacta de la recurrencia, pero la debilidad del tejido anular debido a una cirugía previa, la exposición al levantamiento repetitivo, el trabajo pesado que causa carga axial, la edad avanzada y el tabaquismo son algunas de ellas. PDLR puede manejarse de manera conservadora, pero en caso de que este falle, esos casos son candidatos para cirugía. Se pueden realizar varias cirugías: cirugías abiertas versus mínimamente invasivas, las cirugías de fusión versus no fusión son discutibles. El objetivo del estudio fue evaluar los factores causales del PDLR y el resultado de las cirugías en la población de Bangladesh.
Métodos: Se incluyeron en el estudio un total de 126 casos de PDLR, de un total de 1800 pacientes de cirugía de disco lumbar. Este estudio fue retrospectivo y se analizaron datos multicéntricos de 4 hospitales privados. La relación hombre: mujer fue de 3:2. El período de estudio fue de 2009 a 2018. El período mínimo de seguimiento fue de 1 año.
Resultados: Hubo un riesgo significativo de PDLR en el sexo, el hábito de fumar, el IMC y los trabajadores de carga pesada. Al usar estas diferencias, un análisis de regresión logística demostró que los hombres, el IMC elevada, los trabajadores de carga pesada, el disco residual particularmente debajo del ligamento longitudinal posterior, la vida indisciplina y el ser fumador podían predecir la recurrencia de hernia de disco lumbar. Las cirugías mínimamente invasivas tuvieron mejores resultados que los métodos quirúrgicos abiertos. Las cirugías de fusión con estabilización fueron alentadoras.
Conclusiones: Los pacientes varones, el IMC elevado, los trabajadores de carga pesada, la vida indisciplinada y el fumador podrían predecir la recurrencia de la hernia de disco lumbar. Las cirugías mínimamente invasivas bajo iluminación tienen un mejor resultado que los métodos quirúrgicos abiertos. El disco residual, especialmente aquel localizado debajo del ligamento longitudinal posterior, se asocia con una alta recurrencia de los síntomas. La selección del paciente, el examen clínico, los exámenes diagnósticos y la selección adecuada de los casos recurrentes para cirugía son la clave del éxito.
Palabras clave: *Lumbar, Disco, Prolapso, Recurrencia. (Fuente: DeCS Bireme)*

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Recurrent lumbar disc prolapse (RLDP) is defined as a recurrence of disc herniation or prolapse at the same site of a previous discectomy, after an initial period of symptomatic improvement. During the first postoperative year, 80 to 90% of operations for herniated or prolapsed lumbar discs produce reasonable performance.[1,2] The overall rate of unsatisfactory outcomes after primary lumbar discectomy is 5% to 20%, making recurrent herniation a major cause of pain, disability, and reoperation.[3-5]

Recurrent lumbar disc herniation (RLDH) has been associated with various patient-related factors including male sex, manual labour employment, high BMI, obesity, smoking status, etc. Risk factors for recurrent disc herniation that had also previously mentioned in the literature include constitutional weakness of the annular tissue, sensitivity to excessive lifting or vibration, heavy lifting, advanced age, smoking, the pre-operative size and level of disc herniation and the presence of herniation during surgery. [6-11]

Lumbar disc surgery is a pain-relieving procedure for carefully chosen patients, and most patients are thankful for having undergone an operation.[12, 13] All adverse outcome reports have demonstrated the importance of patient selection as regards predictive risk factors. We have also shown that general context variables such as age, gender, length of symptoms, smoking habits affect the clinical outcome of the first year. As a minimally invasive procedure, percutaneous endoscopic lumbar discectomy has many advantages like less bleeding volume and surgical pain, lower anaesthetic risk, and shorter hospital discernment. In addition to the advancement of endoscopic surgical instruments, indications of endoscopy of the spine have expanded. Leven et al. stated that 69% of patients had reoperation due to recurrent LDH. [14] Although current guidelines suggest fusion operations as a treatment for recurrent LDH. [15]

This research highlights the need for physicians to consider the risk factors and outcome of recurrent lumbar disc prolapse. Risk factors for RLDH are progressively being studied. Kim et al stated that male gender was a risk factor for RLDH; however, many other observational studies found no significant associations between a male gender and RLDH.[16-21] Similarly for smoking, several studies indicated that smoking increased the risk of postoperative recurrence. [22, 23]

This study aims to evaluate the causative factors of RLDP and the outcome of surgeries in Bangladeshi peoples.

METHODS

A retrospective study was performed on 126 patients of RLDP from a total of 1800 patients who underwent lumbar disc surgery from 2009 to 2018. Multicenter data were analysed from 4 private hospitals in Dhaka, Bangladesh. The Minimum follows up period was 1 year. Informed consent from the patients to archive and process personal data in anonymous form was obtained. The inclusion criteria were patients with recurrent disc prolapse not improved by conservative treatment for at least 8 weeks.

Study procedure

The medical records for all patients were evaluated for demographic characteristics including age, sex, weight, and body mass index (BMI). Moreover, all patients were also evaluated for the presence of comorbid conditions potentially predisposing to recurrence (for example, the use of tobacco or diabetes, hypertension). All the statuses were based on data reported at the time of surgery in the patient's chart.

Statistical analysis

All analyses were performed here using SPSS version 25. For each variable, the differences were evaluated separately with logistic regression analysis. The value of P, ($P < 0.05$) has been considered significant.

RESULTS

The patients' demographic characteristics are represented in Table 1. In this study, the maximum patient's age was ≥40 years. The mean age of the patients was 46.21±32.16 ($P>0.05$). A large cohort study by Jansson et al recorded that patients aged 40 to 59 years had a higher risk of reoperation than those aged up to 60. [24] Moreover, another large cohort study by Keskimaki showed a substantially higher risk for older patients. [25]

Sex

In this study, there was a total of 126 cases of recurrent lumbar disc prolapse among 1800 cases lumbar disc surgery patients. As in figure 1, the bar chart is showing that between 126 cases there we found (3:2) ratio of male and female. It showed that males (84) were at higher risk for RLDP than females (42) (Figure 1) ($P< 0.05$). A study of 52

Table 1: Patients demographic characteristics

Characteristics, n=126	Mean ± SD
Sex (male: female)	4:42
Age	46.21±32.16
Weight	76.73±37.68

reported case series has established a male and female ratio of 2:1. [26]

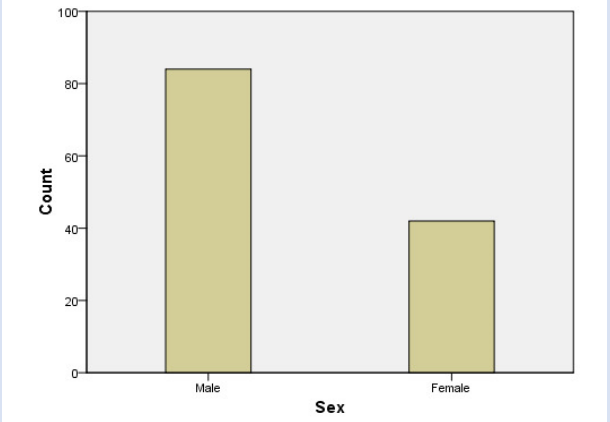

Fig 1: Bar charts showing a high number of RLDP patients were male. It showed that males (84) were at higher risk for RLDP than females (42).

BMI

The normal BMI is 18-24 (kg/m²) and the high BMI is 25-35 (kg/m²) or more in humans according to their height and weight. As in figure 2, we compared a total of 126 patients between these two groups (normal BMI vs. high BMI) using bar charts. The results showed that about 104 patients had high BMI (25-35 kg/m²) and a maximum of them was overweighed and 22 patients had normal BMI (18-24 kg/m²) (Figure 2).

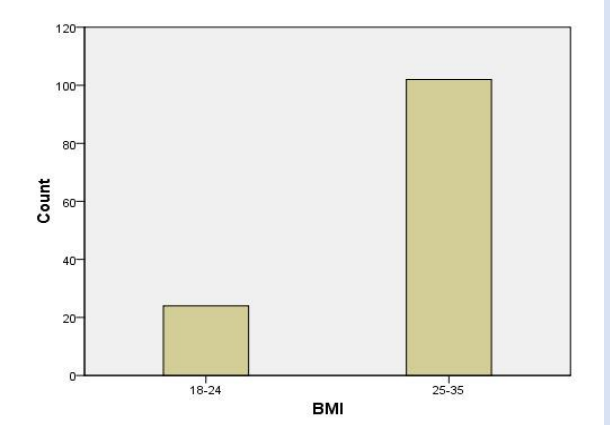

Fig 2: Bar charts showing a high number of RLDP patients had high BMI. Here, about 104 patients had high BMI (25-35 kg/m²) and 22 patients had normal BMI (18-24 kg/m²).

Smoking

Several reports have suggested an increased risk of postoperative recurrence due to smoking. In the Social Insurance Health Examination Survey, smoking proved to be a potent predictor of work disability among occupationally active men. [27] In this study, it has been shown that the number of patients who were smokers is higher than the non-smokers (Figure 3).

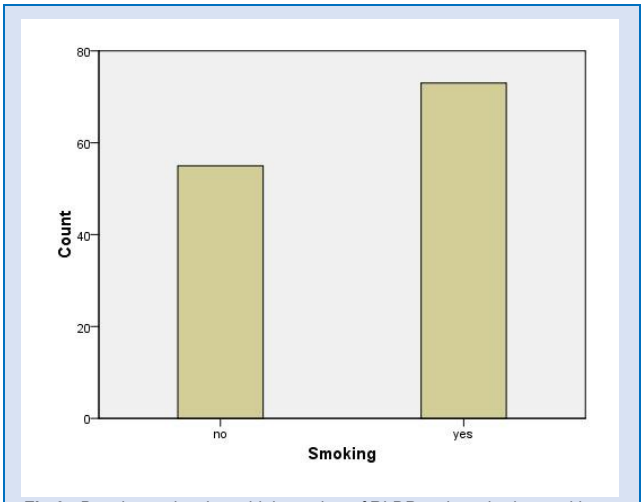

Fig 3: Bar charts showing a high number of RLDP patients had a smoking habit.

Hypertension

As hypertension is known to increase the risk for peripheral and coronary vascular disease, it may be associated with occlusion of small calibre vessels arising from the distal aorta. Considering these findings, we predicted that hypertension could affect recurrent lumbar disc herniation. According to our data reported from the patients, we observed a higher rate of hypertension as well as diabetic patients out there. This study shows that up to 65% of patients were patients of hypertension and up to 60% had diabetes.

Other Risk Factors

Obesity contributes to intradiscal stresses and strains in certain structures of the spine. Obesity also increases the patient's BMI. Kara et al stated that the lack of daily physical activity was a major predictor for RLDH. [28] Dora et al concluded that mild disc degeneration was a risk factor for RLDH. [29]

Occupational Workload

The occupational trait was divided between hard work (lifting or carrying heavy items, forward bending) and light work (sitting and steady posture). In patients with lumbar disc herniation, heavy workers were substantially higher (81% male, 57% female) than lightworkers (male 19%, female 43%) (Table-2).

Several findings indicate occupational conditions contribute to the disease of the lumbar discs. Heavy physical labour and repeated lifting, stooping and postural discomfort are factors likely to result in these cases. [30, 31] Lifting, carrying and twisted or stooped postures increase intradiscal pressure to occur at an unusually. [32]

In table 3, it has been shown that the patients (both male and female) who maintained a disciplined lifestyle faced low recurrences (26.2%) than the patients who lead an undisciplined lifestyle (73.8%) (Table 3).

Table 2: Patient distribution according to occupational workload

Type of workload	Number of patients (male, female)	Percentage %
Heavy work	68, 24	81%, 57%
Light work	16, 18	19%, 43%

Residual disc under the posterior longitudinal ligament

Postoperative MRI of lumbar disc herniation surgeries of the selected patient revealed that residual disc, particularly under posterior longitudinal ligament, was present in 98 (77.7%) patients (P=0.05).
Patients that had these residual discs showed patterns for hi gher levels of recurrence.

Outcome of surgery

Minimally invasive surgery and fusion stabilization surgeries gave better outcomes than open surgical methods in this study. The mean postoperative ODI (Oswestry Disability Index) score of the patients who underwent minimally invasive discectomy (40.34) was better than the patients who underwent open surgical surgeries. And according to our collected data of patient's follow-ups, the satisfactory outcomes were good in fusion & stabilization surgery group (81%) than the other two groups (79%, 67%) respectively (Table-4).

DISCUSSION

Recurrent herniation following disc excision has been reported in 5-15% of patients. RLDH represents a distinctive group of patients with disc herniation, with specific risk factors and clinical profiles. Several factors characterize their distinctive clinical behaviour, including elevated levels of surgical complications and characteristic MRI results, with previous research suggesting that the structure of the disc that contributes to re-herniation could be special. [33, 34]

This research was intended to examine the existing evidence about risk factors for RLDH. Previous studies have shown many potential RLDH risk factors such as age, gender, BMI, smoking, diabetes, type of LDH, work, etc. In terms of gender, when researches were focused on different study locations, we found that it was more likely to suffer from RLDH for male patients when they were Asian citizens.

A report of 8 studies identified BMI as baseline results. Of the 8 studies, two showed a higher BMI in the recurrent group and 6 showed no difference in BMI between the recurrent and non-recurrent group. [35]

With respect to smoking, we concluded that it was more likely for smokers to suffer from RLDH when they were exposed to minimally invasive surgery through a subgroup study. Smoking has already been shown to be predictors of persistent LDH. In Kim and colleague's study, they found smoking was linked to the recurrence of lumbar disc herniation. [36] Nevertheless, combined estimates found that diabetes had a substantial association with RLDH only in smoking.

The exact mechanism by which smoking contributes to disc degeneration is still incompletely understood but may be correlated with the diet and oxygenation of the disc annulus, as well as increased intradiscality.[37-39] Despite these findings, some studies found no connection between smoking and the recurrence of LDH. [40] In addition to poor health results and extended hospitalizations, diabetic patients have also been shown to have a far higher rate of recurrence of LDH. This could be due to the poorer quality of life metrics in diabetics relative to nondiabetic patients. Again, no link was found between diabetes and recurrence of LDH in the study of Kim and co-workers. [35]

The significant indicator of persistent LDH is hard work and heavy work. Kara and his co-workers found that a lack of regular physical activity was a major indicator of reoperation, while occupation showed less importance than regular exercise.[41] Minimally invasive surgery and fusion & stabilization surgeries gave better outcomes than open surgical methods in this study.

CONCLUSIONS

The results of this retrospective study revealed that predictors for RLDP were smoking, increased BMI, male,

Table 3: Satisfactory outcomes and ODI scores in recurrent lumbar disc herniation surgeries

Lifestyle	Number of patients n=126	Recurrence rate
Disciplined	33	26.2%
Undisciplined	93	73.8%

* The patients are disciplined in the lifestyle who followed the rules and back muscle strengthening exercises

Table 4: Satisfactory outcomes and ODI scores in recurrent lumbar disc herniation surgeries

Surgical types	Patients, n= 126	ODI scores % (Preop, Postop)	Satisfactory, %
Fusion & stabilisation surgery	n=42	62.07, 41.92	81%
Minimally invasive discectomy	n=42	65.89, 40.34	79%
Open surgical method	n=42	63.53, 48.25	67%

heavy workers, and diabetes. For the prevention of RLDP, more attention should be paid to patients with these risk factors. The exact mechanism between risk factors and RLDP justifies further research. Because of a limited amount of literature, more evidence from high-quality observational studies is still needed to further investigate risk factors for RLDP.

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Informed Consent
Informed consent was obtained from all individual participants included in this study.

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Conception and design: All the authors *Drafting the article:* All the authors. Critically revising the article: García-Ballestas E. *Reviewed submitted version of manuscript:* Rahman M. *Approved the final version of the manuscript on behalf of all authors:* Rahman M.

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