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RESEARCH ARTICLE

LOWER HALF LAMINECTOMY FOR LUMBAR DISC HERNIATION A STUDY OF 350 CASES IN LAST DECADE

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ABSTRACT

Background: Lumbar disc herniation is one of the most commonly encountered problems in daily neurosurgical practice. Microdiscectomy or open discectomy (MD/OD) are the standard procedures for symptomatic lumbar disc herniation and they involve removal of the offending intervertebral disc compressing the nerve root. Discectomies are done in several ways like laminectomy and discectomy. Microdiscectomy, Endoscopic discectomy etc. We are practicing lumbar discectomy without sophisticated instruments without the aid of headlight loupe or microscopic magnification.

Aim: To study the clinicoradiological profile of the patients who underwent the surgical management of the herniated lumbar disc without magnification under spinal anaesthesia and their outcome.

Material and Methods: This is a study conducted in department of neurosurgery, Nil Ratan Sircar medical college, Kolkata from January 2010- December 2017. 350 patients were operated for symptomatic lumbar disc herniation under spinal anaesthesia. Lower 1/3rd laminectomy of the upper vertebra, shaving of overhanging spinous process, trimming of upper margin of lower vertebra, removal of yellow ligament and discectomy was done. In L5S1 disc prolapsed only ligamentum flavum was removed, No laminectomy was performed. Exclusion criterias included patients with more than 2 level discectomies and high lumbar Disc Herniation.

Results: Of these 350 patients, 1220 patients were Male, 130 patients were Female. Most common age group was between 40 – 60 years. 250 patients had single level disc herniation. Out of 250 patients, In 126 patients L5 S1 discectomy was done, In 103 patients L4 L5 level, in rest 21 patients L3 L4 was intervened. In 100 patients Two level discectomy was done. The duration of surgery was less than 1 hr in 91% of cases. The most common complication was surgical site infection. In accordance to Odom"s criteria the results were ranging from excellent to good recovery in 90 % of patients during discharge. No listhesis was detected radiologically in the post operative period.

Conclusion: All cases were done in spinal anaesthesia. Due to minimal laminectomy, less chances of listhesis post operatively. Adequate exposure is obtained. The duration of stay in hospital is less. The learning curve is less as compared to microscopic or endoscopic procedures. This procedure can be done with minimal requirement of instruments During discectomy the thickened ligamentum flavum (causing canal stenosis/narrowing) can also be delt in single Procedure. Hence, This procedure is also equally effective as other procedures carried out for lumbar discectomy.

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INTRODUCTION

Elective lumbar discectomy is regarded as a good treatment option for lumbar disc herniation if sciatica or, neurological deficits occur and still persist after 6wks of conservative therapy (Deyo, 2007; Gibson and Wadell, 2007; Peul *et al.*, 2007). Mixter and Barr first described partial laminectomy and partial removal of disc as a treatment for symptomatic herniated Lumbar Disc in 1934 (Mixter and Barr, 1934). In the

late 70s Yasargil (1977), Casper (1991), Williams (1978) independently reported microsurgical techniques for treatment of lumbar disc herniation which provided excellent lighting and magnification of the operative field, which in turn enabled the use of a smaller incision and facilitated a less traumatic procedure. Since then, different studies (Casper *et al*, 1991; William, 1978; Andrewa and Lavyne, 1990; Nystrom, 1987; Katayana *et al* 2006) comparing microdiscectomy and standard (open) discectomy techniques report conflicting results regarding the relative merits of the two procedures; however the general consensus appears to be that they yield broadly comparable outcomes (Gibson, 2007; Culloch, 1996). In last 10 years, we have operated over 350 cases of lumbar disc herniation with or without canal stenosis under spinal anesthesia where Macrodiscectomy were performed following removal of lower half of both the upper laminae. Ligamentum flavum was removed in every case irrespective of their thickness and in few cases medial facetectomy and or foraminotomy was performed to achieve adequate root decompression. In L5-S1 disc herniation only the ligamentum flavum was removed without any laminar excision. In all the cases, the disc spaces itself were entered and all available disc materials were removed.

MATERIALS AND METHODS

This was a prospective observational study conducted at the Department of Neurosurgery, N. R. S. Medical College, Kolkata (a tertiary referral hospital) from 2007 to 2017. All the cases were operated in prone position and under spinal anesthesia with Bupivacain / Fentanyl mixture. Prophylactic antibiotics were given for 8 days including pre and post operative periods in all the cases.

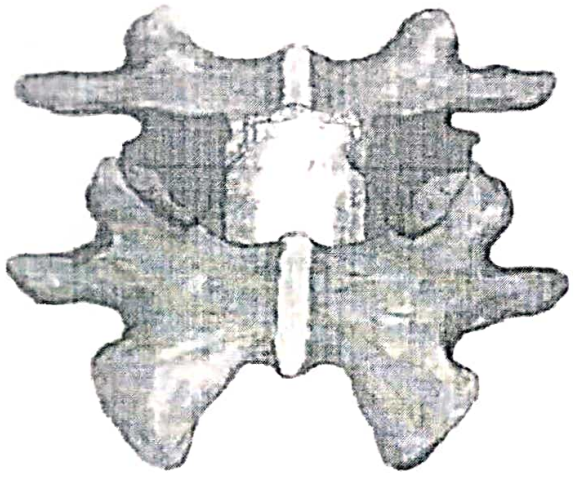

Figure 1. Graphical picture showing removal of lower half of both lamina to expose the thecal sac

Exclusion criteria: Patients having severe canal stenosis with facet arthropathy or, any radiologic evidence of sublaxation and more than 3 levels involvement were not included in this study. The patients were assessed clinically along with MRI and Dynamic X-Ray of Lumbosacral spine before any operative intervention. Postoperative evaluation was performed according to Odom's criteria (Culloch, 1996). Details of operative procedure: The patients were kept prone following spinal anesthesia. A midline incision was made one level above and below centering the involved segment. In few cases C-Arm intensifier was needed specially when there is sacralizaion / lumbarization was detected in preoperative imaging. The spine and laminae were exposed centering the involved disc space. Part of spinous process and intraspinous ligament was removed. The lower half of both the laminae were removed till the epidural fat peeps through the ligamentum flavum in the midline. Ligamentum flavum was removed bilaterally and in few cases over hanging part of the hypertrophied medial facets needed removal with carrison's punch. Discectomy then performed by standard technique till all available disc materials were removed macroscopically. Bilateral roots were checked for any further compressin element till they enter into the respective foramens. In case of L5S1 disc prolapse, only the ligament flavectomy was performed without any laminectomy to achieve desired discectomy. Wounds were closed in layers following proper hemostasis. All the patients were allowed to sit up as soon as the pain is tolerable. External orthosis (LS brace) was advised where two level surgery was performed or, where medial facetectomy was done.

Follow up: Post operative Clinical assessment has been done in the next day and at discharge according to Odom's Criteria.

Odom's Criteria:

- **Excellent**: All preoperative symptoms relieved; abnormal findings improved.
- **Good**: Minimal persistence of preoperative symptoms; abnormal findings improved or unchanged.
- **Fair:** Definite relief of some preoperative symptoms; other symptoms slightly improved or, unchanged.
- **Poor:** Preoperative symptoms and signs are unchanged or, exacerbated.

RESULTS

Total No. patient: 350.

Period of study: 10 Yrs (2007 October – 2017 September).

Place of study: Department of Neurosurgery, N. R. S. Medical College, Kolkata.

Table 1. Age distribution

Age group in years	Total number of patients
0-20	14
20-40	98
40-60	168
>60	20

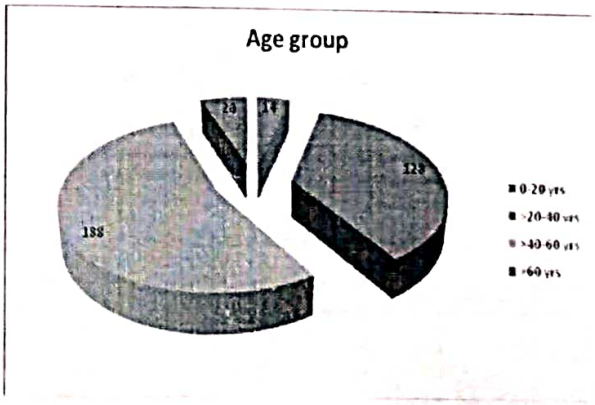

Figure 2. Age distribution

Table 2. Sex distribution

Male	220
Female	130
Total	350

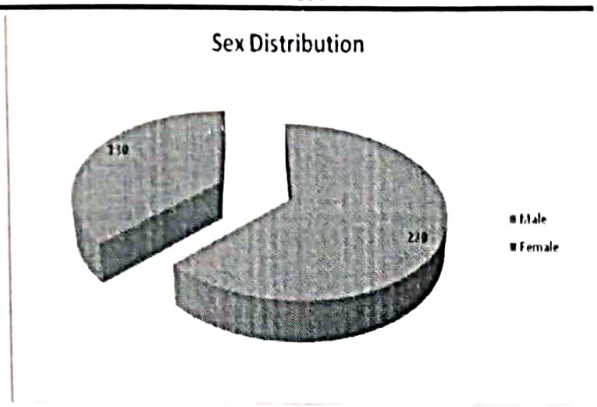

Figure 3. Sex distribution

Table 3. Clinical features

Clinical features	Number
Localized pain	50
Radicular pain	280
Sensory deficit	90
Motor deficit	110
Sphincter involvement	50

Table 4a. Level of involvement: 250 patients had single level involvement

Level	Number
L5-S1	126
L4-L5	103
L3-L4	21
Total	250

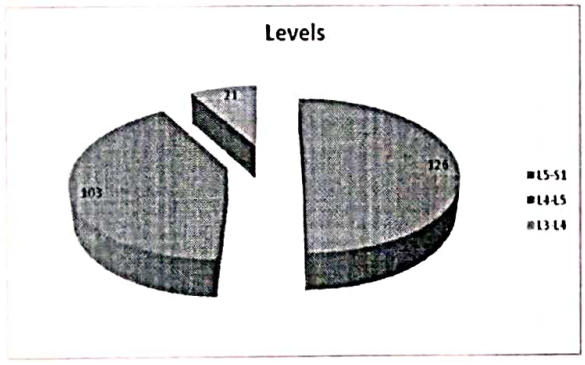

Figure 4. Level of involvement

Table 4b. Level of involvement: 100 patients had two level involvement

Levels	Number
L4-L5 and L5-S1	75
L3-L4 and L4-L5	25
Total	100

Table 5. Duration of surgery

Duration of surgery	Total number of surgeries
<1 hour	318
>1 hour	32

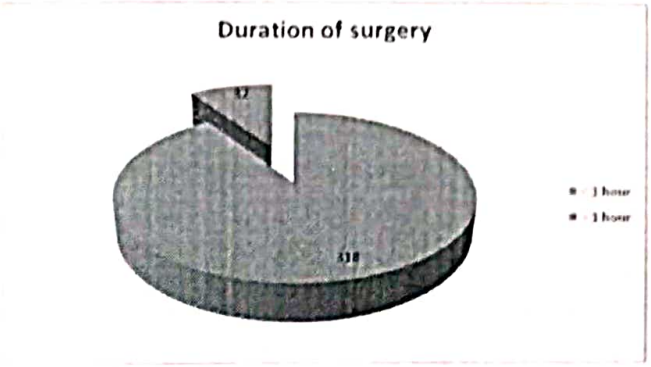

Figure 5. Duration of surgery

Table 6a. Post operative recovery at discharge: Post operative recovery and follow up done by Odom's criteria

Status of patient	Number of patients
Excellent	212
Good	105
Fair	33
Poor	00
Total	350

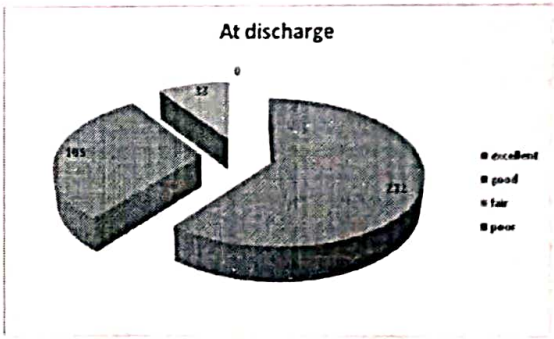

Figure 6a. Post operative recovery at discharge

Table 6b. Follow up

Follow up at	Excellent	Good	Fair	Poor
6 weeks	215	102	33	00
3 months	220	100	30	00
6 months	230	95	25	00
1 year	250	85	15	00

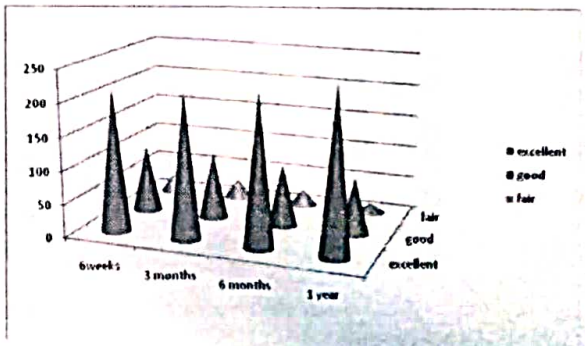

Figure 6b: Follow up

Complications	Number of patients
Surgical site infections	13
Dural tear	08
New onset limb radiculopathy	08
Discitis	04
General complications	09

Figure 7. Complications

Table 8. Hospital stay

Hospital stay	Number of patients
<7 days	308
>7 days	42

The percutaneous systems such as chemonucleolysis (Smith and Brown, 1967), percutaneous lumbar discectomy (manual (Hijikata, 1989) and automated (Onik *et al*., 1985)), nucleoplasty and percutaneous laser-assisted discectomy (Choy *et al*., 1992) cannot deal with disc fragment extrusions and associated bony and ligamentous compression. The results of these procedures have been very variable and speculative ranging from 29% to 92% success rate (Hussain *et al*., 2005). Open discectomy (OD) and microdiscectomy remain the current standard of surgical treatment (Tait *et al*., 2009). Several recent prospective RCTs have compared OD to tubular retractor-based MED (Arts *et al*., 2011) and success rates have been found to be similar. In our series, there was 13 wound infection at a rate of 3. 71%, discitis rate of 1. 14% and a durotomy rate of 2. 28%. These rates compared favorably with those reported by Ebling *et al*., (1986) (3. 3%, 0. 8% and 3. 9%, respectively), Caspar *et al*., (1991) (0. 7, 0. 7 and 6. 7% respectively),

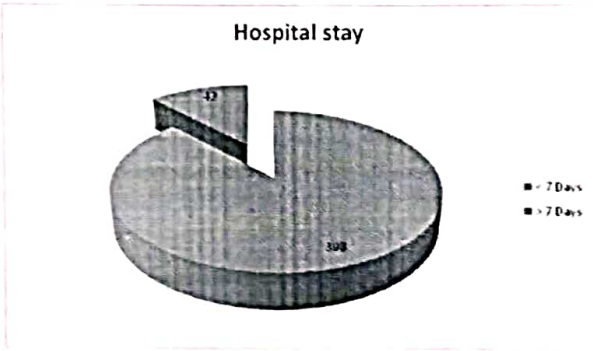

Figure 8. Hospital stay

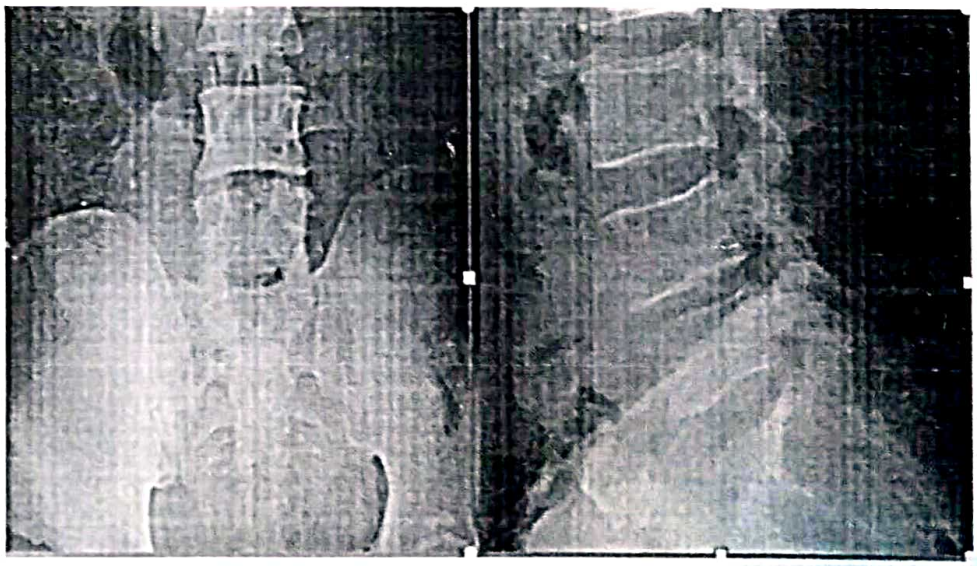

Figure 9. Lumbo-sacral spine AP and Lateral view showing L5 Laminectomy defect

DISCUSSION

Lumbar disc herniations causing significant or new neurological deficit, cauda equina syndrome, or those refractory to conservative treatment are dealt surgically (Foley and Smith, 1997). A proper technique should lead to satisfactory outcomes, minimal morbidity and good cosmesis. It should be cost effective, able to adjust to patient factors like obesity, ethnicity, etc.

Williams *et al*., (2009) (0. 0 and 0% respectively) and Pappas *et al*., (1992) (7. 2, 0. 5 and 1%, respectively). Yoshito Katayama *et al*. (2006) demonstrated in their study in 2006 that there were no significant differences between the macro and micro discectomy procedures in the frequency of use of an analgesic agent after surgery, but significant differences were observed in the operation time, amount of bleeding, duration of hospitalization, the differences were not large, and may not

have been clinically significant. In our study also showed similar results. Microdiscectomy or endoscopic discectomy having following limitations like it requires costly instruments, specialized centre and expertise, large Central discs, ligamentum hypertrophy cannot be dealt with microscopic or endoscopic techniques, Canal pathologies other than discs difficult to treat and having increased recurrence rate than the open technique (Arvind *et al*., 2014). Microdiscectomy and endoscopic discectomy having minimal exposure while limited laminectomy as in our study showed adequate exposure of the disease segment with very less chance of residual disc or delayed instability also can be done without specialised instruments, easy to learn and master.

Conclusion: The method we used was

- Cost effective
- No need of general anesthesia
- Early mobilization
- No special high cost sophisticated instruments
- Results comparable to micro discectomy/ endoscopic surgery
- Less chance of residual disc materials
- Can be done in any hospital, has a smaller learning curve.
- During discectomy the thickened ligamentum flavum (causing canal stenosis/narrowing) can also be dealt in single Procedure.

Although newer modalities of treatment of lumbar disc disease are evolving but open limited laminectomy remain a good treatment option with comparable results. That procedure can also be done in a setup with limited facilities.

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ORIGINAL ARTICLE ASIAN JOURNAL OF MEDICAL SCIENCES

Surgical outcome of intradural extramedullary meningiomas without dural resection – A study on 75 cases

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ABSTRACT

Background: Spinal tumor is a common cause of morbidity in otherwise healthy population, timely diagnosis and treatment of spinal tumor gives excellent outcome. **Aims and Objective:** We report experience and clinical outcomes of 75 cases with Intradural extramedullary meningiomas operated in last 21 years. **Materials and Methods:** All the patients were clinically assessed with Nurick's Grading (both pre and post operatively). MRI was the main armamentarium for operating planning. In all the patients dural attachments were coagulated without any dural excision. **Results:** Out of 75 patients, 65% were female. Peak incidence was noted in 4th& 5th decade and majority of patients having tumor in the thoracic spine and lateral to the cord. The entire patient showed remarkable clinical improvement according to Nurick's grade. Total removal was achieved in 69 (90.2%) patients. Two patients had re-growth of tumor in 1 yr. follow up. No postoperative mortality noted in the present series.**Conclusion:** Spinal meningioma excision without dural resection did not show any increase in recurrences.

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Key words: Meningioma; Intradural extramedullary; Nurick's grade

INTRODUCTION

Meningiomas represent the 2nd most common tumors following Schwannoma and accounts for about 25-46% of all spinal canal tumors.[1] Spinal Meningiomas presumably arise from meningothelial arachnoid cluster cells and therefore are located at the exit zone of the nerve roots or, the entry zones of arteries into the spinal canal. Those origins account for the tendency of the tumors toward lateral or anterolateral location.[2] Though, uncommonly they are also found in the posterior to the spinal cord and they may occur at any level along the spinal axis but about 80% are thoracic.[3,4] Meningiomas arise in any age group, but the majority of them occur in individuals between the fifth and seventh decades of life. Early diagnosis and surgery produce excellent results in general. The purpose of this study is to share our experience regarding clinical outcomes of 75 cases with Intradural Extramedullary (IDEM) meningiomas, which were operated in last 21 years.

MATERIALS AND METHODS

This study includes 75 cases of IDEM meningiomas operated consecutively at Bangur Institute of Neurology & N.R.S. Medical College, Kolkata in last 21years(1996 – 2017). These tumors with respect to their location, clinical features at the time of admission and discharge (assessed according Nurick's Grading)[5] and operative outcome has been analyzed with a mean duration of follow-up of 1year after surgery. No cases other than IDEM location were included in this study. 19 patients were not available at 1year after operation for assessment as they lost from follow up. As almost all patients presented with some difficulty on walking at the time of diagnosis, Nurick's grading was

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selected for their clinical assessment in this study.All the patients were evaluated with MRI (Plain & contrast study) before taking operative interventions.

RESULTS

Fifty four females and 21 males' patients were included in this study. Peak incidence of the disease was found to be in 3rd and 4th decade and majority of them presented with weakness of both lower limbs (78%) followed by sensory changes (63.4%). Majority of the tumors were found in the thoracic spine and laterally placed. The patient demographics regarding age, gender, symptomatology, clinical findings, Nurick's grading, surgical outcome etc. are depicted in Tables 1-9.

Among total 75 patients, 13 females and 6 males were lost at 1 year follow up.

Surgical strategy

- Posterior/Posterolateral Tumors
  - Laminectomy
  - Total removal
  - Scrapping or removal of inner dural layer
  - Coagulation of dural attachments
- Anterior/Anterolateral Tumors
  - Exrended laminectomy
  - Total removal if possible
  - Near total removal followed by coagulation of residual tumor matrix.

Table 1: Age distribution (N=75)

Age distribution	Number of patients
11 – 20 yrs	07 (9.33%)
21 – 30 yrs	10 (13.33%)
31 – 40 yrs	22 (29.33%)
41 – 50 yrs	21 (28%)
51 – 60 yrs	09 (12%)
61 – 70 yrs	06/05

Table 2: Sex distribution (N=75)

Male	Female
24 (32%)	51 (68%)

M:F=1.4:3

Table 3: Duration of symptoms (N=75)

Duration of symptom	Number of patients
0 – 1 month	04 (4.8%)
1 – 3 months	09 (12.1%)
3 – 6 months	11 (14.6%)
6 months – 1 yr	40 (53.6%)
1 yr – 2 yrs	07 (9.7%)
More than 2 yrs.	04 (4.8%)

DISCUSSION

Spinal meningiomas may arise in any age group but have a peak incidence between the age of 40 and 70 years. Symptoms develop below 30 years of ages only 10% of cases, and tumor infrequently occurs under the age of 15[6]. In our series the peak incidence was found between 31 – 50 years.

The Cleveland clinic study showed 83% of meningiomas were in thoracic region and in fair sexes, whereas men had nearly equal frequency of cervical (41%) and thoracic (47%) lesions. The reason for this predilection for the thoracic spine in women is unknown.[4] Several lines of evidence suggest that, the growth rate of meningiomas may be affected by female sex hormones.[1,7,8] There is a two fold increase in the incidence in women as compared to men.[2] In many series, approximately 80% of cases occur in women.[4,6] The recent series, the female to male ratios in patients with spinal meningioma ranged from 3 and 4.2 to 1, and the ages of the people affected ranged mostly from 40 to 70 years.[1,8,9,10] The size or symptomatology of meningiomas frequently increases transiently in during pregnancy.[11,12] Furthermore, there is a two to four fold increase in the rate of meningiomas seen in women with breast cancer as compared with age-matched control subjects.[13] We didn't have such experience regarding the hormonal influence over the tumor but, the females were affected more than men also observed in the present series and female- to-male ratio is 3:1.4 (Table 2).

Most of the patients presented between 6months and 1 year (Table 3) and paraparesis was the most common symptom (78%), followed by sensory symptoms (63.4%). Paraparesis was noted as predominant symptom by Sang Hoon Yoon in his series in 2007.[14] Though, pain is the most

Table 4: Clinical features (N=75)

Localized pain	38 (51.2%)
Radiculopathy	18 (19.5%)
Parasthesia	26 (34.1%)
Sensory changes	48 (63.4%)
Paraparesis	59 (78%)
Paraplegia	04 (4.8%)
Quadriparesis	10 (13.3%)
Bladder involvement	18 (24.3%)
Respiratory distress	02 (2.4%)

Table 5: Nurlick's grade [Pre-op] (N=75)

Grade 1	Normal walk	05 (6.66%)
Grade 2	Slight difficulty on walking	16 (21.33%)
Grade 3	Limitation of normal work	34 (45.33%)
Grade 4	Cannot walk without help	15 (20%)
Grade 5	Bed ridden/Wheel chair	05 (6.66%)

Table 6: Distribution of tumors according to MRI (N=75)

Site	Position in relation to the cord					
	Anterior	Anterolateral	Lateral	Posterolateral	Posterior	Number
Cervical	01	03	03	04	00	11
Cervicodorsal	00	01	04	02	02	09
Dorsal	02	12	11	19	07	51
Dorsolumbar	00	00	00	03	01	04
Number	03	16	18	28	10	75

Table 7: Surgery (N=75)

Total removal	69 (90.24%)
Near total removal	06 (9.76%)
Dural resection	00 (0%)
Coagulation of dural attachment	75 (100%)

Table 8: Complications (N=75)

Morbidity	10	13.33%
Wound infection	06	08%
UTI	09	12%
RTI	06	08%
CSF leakage	04	5.33%
Mortality	NIL	0%

common symptom in other series,[1,4,8,9] pain was present in 51.2% cases in the present series.

Most meningiomas attach to the insertion of the dentate ligament and they may extend ventrally or dorsally.[6] In present series, 62 patients out of 75, attachments of the tumors were lateral to the cord and the thoracic region was affected mostly (Table 6) corroborating with other studies.[3,4,15]

Ninety percentof spinal meningiomas are purely intradural in location, the remaining 10% may have both intradural and extradural components, or may be completely extradural.[4,6] Extraduralmeningiomas are considered more biologically aggressive than those in the intradural location and more common in men.[4,16] Very rarely meningiomas may be in the intramedullary compartment.[17] Spinal meningiomas are usually solitary, although multiplicity is observed occasionally, particularly in patients with vonReclinghausen's disease. The overall incidence of multiplicity is 1-2%.[2]

We purposefully exclude the extradural or intramedullary meningiomas from this study as they are very small in numbers and alsowe didn't get any multiplelesions in any of our patients.

Spinal meningiomas may occur simultaneously or, in association with intracranial meningiomas.[18] Cushing and Eisenhardt[19] found the ratio of spinal to intracranial meningiomas being 1:16, but in India the comparative incidence seems to be higher (1:4).[20] We didn't get such cases in present study.

Plain x-rays are usually uninformative in the evaluation of patients with completely IDEM lesions, however occasionally calcification within the meningiomascan be seen in the plain x-rays.[2,21] MRI with or, without contrasts the imaging study of choice and is frequently sufficient for diagnosis and future surgical planning for any IDEM tumors in present days.[22,23] All of our cases were evaluated with MRI. In MRI, meningiomas are usually having broad dural base, iso-intense or, slightly hypo-intense in T1-weighted image and iso-intense in T2-weighted image with homogenous contrast enhancement. The dural enhancement (dural tail) is an important finding. (Figures 1-6).

At the time of operation, every attempt was made to preserve the arachnoid to minimize the risk of spinal herniation and preferably to stay in extra-arachnoid plane during tumor resection as meningiomas are exra-arachnoidal mass. Small tumors were removed in toto after separation of arachnoid and other important surrounding structures. Otherwise a piecemeal removal was preferable. In case of anterior or antero-lateral tumors, the dentate ligaments can be used as a tag for rotation of the cord to expose the tumor. For these tumors CUSA (Cavitron Ultrasonic Surgical Aspirator) is an important tool as it creates rapid debulking without displacing neural or tumor tissue. Dural attachments were coagulated in all the patients. Complete tumor removal was achieved in more than 90% of the patients (Table 7).The rate of total removal of the tumor was reported to be 82% by Levy et al.[4] 92.6% by Roux et al.[8] and 97% by Solero et al.[1] Complete removal of attached dura is usually followed by no recurrence, but usually it is adequate to remove only the inner leaf of the dura in the region of meningioma insertion.[3] In some cases, particularly with markedly calcified meningiomas, a small amount of tumor may be left and incomplete removal IDEM meningiomasmay also have an excellent prognosis, with no recurrence or, recurrence delayed by several years. However, epidural meningiomas or calcified meningiomas often do not have such excellent prognosis.[4] Frequently, one or more nerve roots may have to be sectioned in order to remove

Figure 1: Dorso-lumbar meningiomas T2 & T1

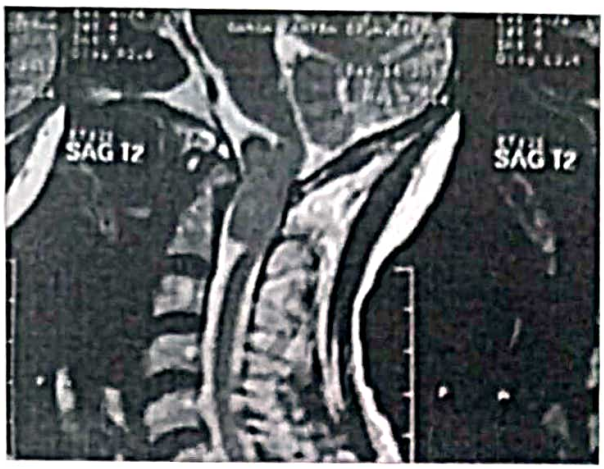

Figure 4: High cervical meningiomas T2

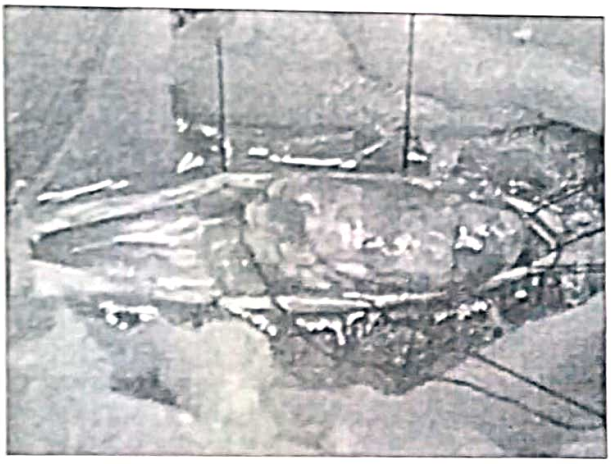

Figure 2: Per operative view IDEM meningioma

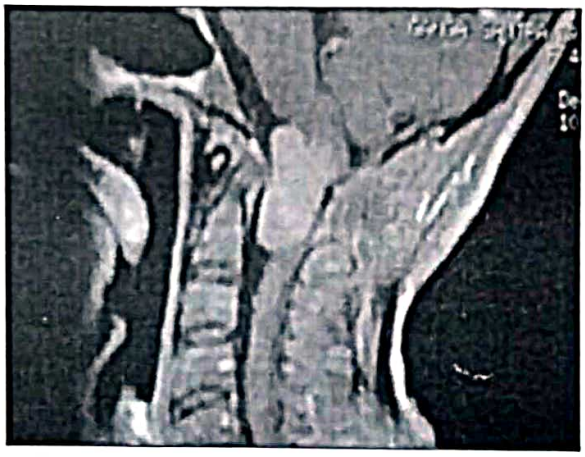

Figure 5: High cervical meningioma (contrast)

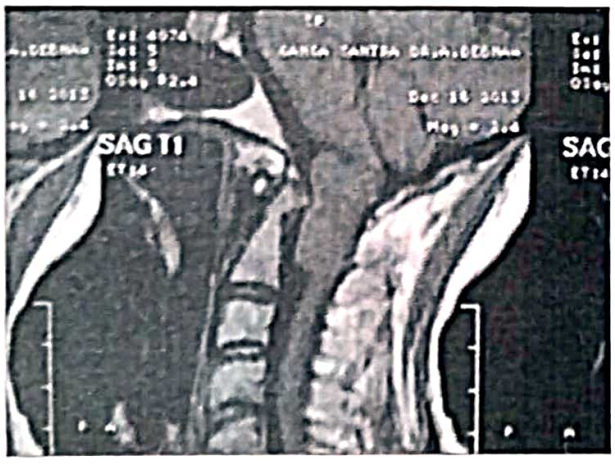

Figure 3: High cervical meningioma T1

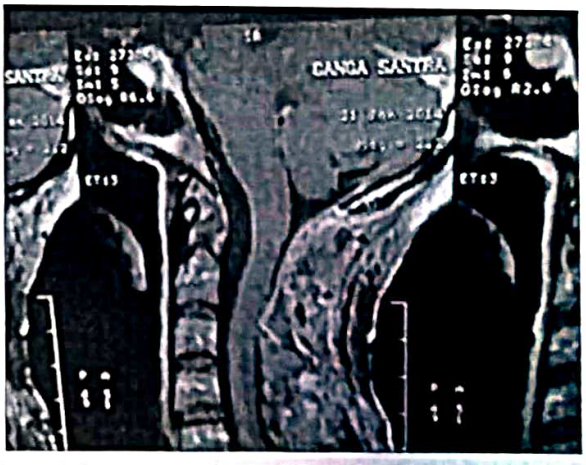

Figure 6: Post operative image of the same patient

the tumor with minimal manipulation of the spinal cord. Usually it is safe to section both anterior and posterior nerve roots from C2 to C4 as well as within the thoracic region below T1.[24] Freidberg SR[25] commented in his article, `total resection of a spinal canal meningioma usually is not difficult, but if the tumor is ventral to the cord and calcified, surgery becomes hazardous and may damage the cord'.Similar experience was noted in the present study.

Table 9: Functional outcome (According to Nurick's Grade)

Nurick's grade	No. of patient at discharge (N=75)	No. of patient at 6wks. F.U. (N=75)	No. of patient at 1yr. F.U. (N=56)
Grade 1	52 (69.3%)	61 (81.3%)	45 (80.3%)
Grade 2	18 (24%)	12 (16%)	08 (14.28%)
Grade 3	04 (05.3%)	02 (2.66%)	02 (3.57%)
Grade 4	01 (1.3%)	00	01 (1.78%)
Grade 5	00	00	00

Two (02) patients had recurrence at 1yr. follow up.

As majority of the patients present with walking difficulties, we chose the Nurick's Grading[5] for clinical assessment of our patients though it was not a common scale for assessment of spinal tumors. Majority of the patient were in the grade 3 followed by grade 2 & 4 pre-operatively. Post operatively almost all showed remarkable improvement and more than 80% patientsbecame in grade 1 within 6 weeks of surgery (Tables 5 and 9). We didn't get any similar study to compare our result in this regard. Stein BM and McCormick PC[26] mentioned that, the immediate results and prognosis in the common IDEM tumors including meningioma and nerve sheath tumors have been well established; when removed carefully and thoroughly, patient should be cured with excellent prognosis. Even in patients who have been devastated neurologically by the growth of these tumors before surgical intervention, there is some hope – especially in young individuals – that many of the neurosurgical abnormalities may resolve slowly in the post-operative period. It may take 18 months to 2 years to maximize the resolution of these neurological deficits and some patients have improved progressively beyond this time. Patients' age and duration of symptoms are also important prognostic factors.[3,4] Once the paraplegia or quadriplegia becomes established, there is a little hope for good recovery. Spastic paraplegia has favorable prognosis. The power may not improve even after complete removal of the tumor, if paraplegia has progressed to flaccidity.[27] Similar observation was also noticed in the present study.

Levy WJ Jr et al. and Solero CL et al. noted the morbidity rate is usually less than 15%. Complications include CSF leak, pseudomeningocele development, wound breakdown, meningitis, arachnoiditis, syringomyelia and spinal destabilization as well as other routine complications of spinal surgery and general anaesthesia.[1,4] Surgical complications occurred in the present series in 13.33% of patients, among which UTI occurred in maximum number of patients (probably due to prolong indwelling catheter) (Table 8). We didn't encounter any pseudomeningocele formation, meningitis, or syringomyelia or spinal destability in this study. Two patients had recurrence in 1yr follow up. In both have them tumor could not be removed in totally and one of them had partially calcified tumor, who didn't give consent for re-operation and lost from follow up after 1 year.

Solero et al. and others[1,3,4,28] found no significant difference between the recurrences of spinal tumor treated with radical resection of the dura and recurrences of those treated with tumor removal and coagulation of the dural attachments.The reported recurrence rate for meningiomas that have been totally removed is 1.3% at 5 years and 6% at 14 years, and even in subtotal resection, recurrence rates of less than 15% have been noted. Excision of dural margin, in contrast to simply cauterizing the margins, is associated with a lower recurrence rate (4-8% for dural margin cauterization and 0 – 5.6% for dural margin excision).[1,4,8] Yoon S.H[14] in their 35 years study, found no recurrence of intraspinalmeningiomas once gross total resection was achieved, regardless of the control of the dural origin. Two patients (2.6%) in our series showed recurrence in 1year follow up. A meningioma with enplaque extension is difficult to remove grossly and has increased risk of post operativearachnoidal adhesions with delayed neurological deficits.[4]

CONCLUSION

- IDEM meningiomas in majority, affects females and occurs in the thoracic region; mostly arises lateral to the cord.
- Nurick's gradation is a good clinical assessment tool for IDEM lesions including meningiomas.
- Microscopic surgical dissection with total removal is the goal and gives the best long term result. However, unusual and difficult locations present a challenge to the neurosurgeons unsurpassed by any other benign lesion.
- There is no significant increased recurrence rate for simply cauterization of dural attachments instead of dural excision.

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KR- Concept and design of the study, manuscript preparation, statistically analyzed and interpreted, critical revision of the manuscript; **PG-** Concept and design of the study, critical revision of manuscript and review of the study; **SKS-** Concept and design of the study, critical revision of manuscript and review of the study; **PT-** Concept and design of the study, critical revision of manuscript and review of the study.

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Originals and Papers

Intracranial Epidermoid — A 10-year Study

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Twenty-eight cases of intracranial epidermoids were operated over a period of 10 years at the Bangur Institute of Neurology, Kolkata; 17 of them were male and 11 were female with an age range of 11 to 55 (mean 28.21) years. Their locations include — cerebellopontine angle region (n=15), fourth ventricle (n=6), lateral ventricle (n=3), corpus callosum (n=2), pineal region (n=1) and basal cistern near temporal lobe (n=1). Hearing loss and vertigo were commonest features of cerebellopontine angle epidermoids. Fourth ventricular tumours presented with gait disturbances and cerebellar signs. Symptomatology of other lesions were varied. CT scan was diagnostic in 23 cases. Sixteen patients had ventriculomegaly and 10 of them required ventriculoperitoneal shunt. Total removal was achieved in 6, near total in 14 and partial in 8 cases. Five patients died. Postoperative complications included chemical meningitis in 7, worsening of cerebellar functions in 3 and aggravation of cranial nerve deficits in 2 patients. All of them except one case of cranial nerve deficit resolved with time. Nineteen patients were followed up over a mean duration of 5 years and 10 months. Reoperation was required in one. Rest had satisfactory outcome.

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Key words : Epidermoid, intracranial.

Intracranial epidermoids are slow growing benign lesions arising from ectodermal remnants due to incomplete cleavage during the third to fifth week of gestation[1,2]. These lesions commonly affect subarachnoid cisterns at the base of the brain. Pure intracerebral locations are less frequent. Their close proximity and adherence to neurovascular structures render total removal difficult. Due to slow and linear growth rate partial removed yields have reasonably good results and reoperation is only infrequently required. In this presentation the experience of 28 cases of intracranial epidermoids operated in this institute over a period of 10 years is summarised.

Material and Method

During the period of 10 years (1991-2000) 908 cases of primary brain tumours were operated at the Bangur Institute of Neurology, Kolkata and 28 of them were epidermoids. After thorough clinical examination and neuroradiological investigations (CT scan and MRI) they were operated. Approaches of interventions were determined by the locations and extents of lesions. Peroperative problems and postoperative results during discharge and at the time of follow-up over subsequent years were analysed in detail. The experience was reviewed with the background knowledge obtained from the literature on this intriguing disease entity.

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Observations

Of the 28 patients, 17 were males and 11 were females (male : female = 1.6 : 1) with an age range of 11 to 55 (mean 28.21) years (Table 1). Amongst the infratentorial tumours (n=21, 75%), 15 (53.57%) were located in the cerebellopontine angle (CPA) region (6 localised, 9 generalised) and 6 (21.43%) were in the fourth ventricle. Of the remaining 7 cases (25%) of supratentorial tumours, 3 were in the lateral ventricle, 2 at corpus callosum, 1 at pineal region and 1 at the basal cistern near right temporal lobe.

Presentations varied according to the site and extent of lesions. History of headache, irritability and neck stiffness suggestive of chemical meningitis due to leakage of contents was obtained in 4 cases. All except 2 cases of CPA epidermoid presented with cranial nerve involvement — the commonest symptom being hearing loss (n=12). Trigeminal nerve involvement was detected in 9 patients (sensory 9, motor 2), but only 3 of them presented with trigeminal neuralgia. Facial nerve paresis was detected in 8 patients and hemifacial spasm in 2 patients. Lower cranial nerves were involved in 3 cases. Cerebellar features (n=10) and long tract signs (n=5) were observed frequently. Four

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CONTRECOUP HEAD INJURY : A TWO-YEAR EXPERIENCE.

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ABSTRACT

Contrecoup head injuries can be defined as a group of focal head injuries that occur at a site opposite to the site of impact. It is predicted that the outcome of this type of injuries is worse than other focal injuries due to the transmission of the impact across the brain. At Nilratan Sircar Medical College, Kolkata, 105 patients presenting with contrecoup injuries over a period of 2 years were prospectively analyzed. Site of primary impact was determined clinically and by CT scan. Age, mode of injury, Glasgow coma scale (GCS), site and pattern of injury, and mortality were analyzed in our study. Our study supports the hypothesis that the presence of contrecoup contusions is associated with a poor prognosis across all GCS and age categories.

KEYWORDS

Contrecoup, head injury, traumatic brain injury

INTRODUCTION

Traumatic brain injury is one of the most leading cause of morbidity and mortality across the world. Focal brain injuries are found in approximately one-half of all the patients with severe brain injuries and are responsible for nearly two-thirds of the deaths.[1-3] Contrecoup injuries comprise a group of focal brain injuries that occur at areas distant from the point of impact as a result of shock waves traveling across the brain causing stress/cavitation effects.[4] It is increasingly evident that the pattern of structural brain injury as visualized by imaging and the depth and duration of ischemia are also important factors in prediction of outcome.[5-6]

The presence of a contrecoup injury implies a more severe primary impact, and therefore an injury more diffuse than focal. It has been hypothesized that patients with contrecoup injuries would have a worse outcome because of the diffuse nature of injury.[7] With computed tomographic (CT) scan, it is possible to localize and delineate the type and severity of injury in the majority of head-injured patients and determine whether injuries are coup or contrecoup. Literature search reveals very few studies showing various presentations, modes of injury, and outcome of contrecoup injuries till date.

The present study was undertaken to evaluate the modes of injury and various presentations in contrecoup brain injuries. We believe that data from the present study will be a useful additional reference in head trauma cases and will increase awareness of contrecoup injuries during imaging review. Earlier detection of contrecoup injuries can minimize the complications of head trauma.

MATERIALS AND METHODS

A prospective study of 1,950 patients with blunt head trauma admitted to Nilratan Sircar medical college, Kolkata, within a 2-year period was performed. The case records were studied regarding age, sex, mode of injury, Glasgow coma score (GCS), and focal neurologic deficits at admission and at discharge. CT of the brain was performed in all the cases at the time of admission and after 72 hours or anytime as and when required.

- **Inclusion criteria:**

1. Definite history of head trauma.
2. Unequivocal evidence of a localized area of impact either in the form of fracture, scalp laceration, or galeal hematoma.
3. Presence of contrecoup injury opposite to the site of impact or fracture, as detected in initial CT scan.

- **Exclusion criteria:**

1. Patients with nonhemorrhagic contusions.
2. Patients with other systemic injuries and polytrauma.
3. Patients with associated coup injuries.

Outcomes measured in this study were the incidence of modes of injury, the various types of injury, and the mortality rate among this group.

RESULTS

A total of 105 patients out of 1,950 had only contrecoup injury.

- Age: The patients' age ranged from 8 to 85 years with an average age of 43.8 years. 45 patients were younger than 40 years.
- Modes of injury: The most common mode of injury was road traffic accident accounting for 54.29% (n=57) followed by fall 23.8% (n=25) and assault 11.43% (n=11). However, the cause was undetermined in 10.5% (n=11) cases.
- GCS on admission: The GCS of the patients on admission ranged from 4 to 15 (mean 9.40). 48 patients had GCS≤8.
- Site of contrecoup injury: The most common site of contrecoup injury was the temporal region accounting for 40% (n=42), followed by frontal region 30.4% (n=32), parietal region 20.9% (n=24), and occipital region 6.6% (n=7). Five patients had hematoma in the posterior fossa.
- Patterns of injury: Based on the criteria, acute hemorrhagic contusion ([Fig. 1]) was the most common pattern, followed by acute subdural hematoma (SDH), SDH with contusion, SDH with subarachnoid hemorrhage (SAH) ([Fig. 3]), and acute extradural hematoma (EDH) ([Fig. 2]) ([Table 1]).

Table 1 Patterns of head injuries

Type of lesion	No. of patients	Percentage
Contusion	49	46.7
Acute SDH	29	27.6
Acute SDH with contusion	20	19
Acute SDH with SAH	05	4.7
Acute EDH	02	1.9

Abbreviations: EDH, extradural hematoma; SAH, subarachnoid hemorrhage; SDH, subdural hematoma.

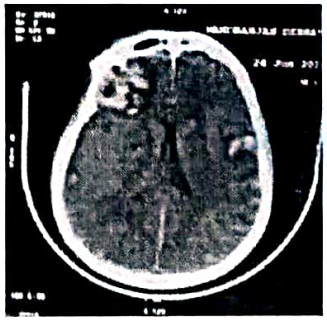

Fig. 1 Acute hemorrhagic contusion.