



A MICROSURGICAL APPROACH TO LUMBAR PARAVERTEBRAL TUMOR USING THE LATERAL RETROPERITONEAL APPROACH

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Abstract:

Aim: Method of surgery and efficiency of postoperative therapy following microsurgical excision of the lumbar paravertebral tumor using a lateral retroperitoneal approach.

Methods: A retrospective investigation of the case files of patients at Mayo Hospital in Lahore, Pakistan, who had lumbar paravertebral tumors removed using the approach of lateral retroperitoneal was carried out. Information on the length of the operation, the blood amount that was lost, the cut length, the number of days spent in the hospital, the percentage of paravertebral tumor that was removed, patients' ability to do ADLs after surgery, and the occurrence of complications were also gathered.

Results: The duration of the operations varied from 50 minutes up to 180 minutes, with an average of (95 ± 50) minutes. An average blood loss was 32.5 ± 37.6 ml (range: 10-90 ml). On average, the length of the incision was (7.5 ± 0.5) centimeters. Patients spent an average of (9.2 ± 2.3) days in the hospital. The range was 6-12 days. The paravertebral tumor had a perfect resection rate. Three individuals were found to have Schwannomas after surgery, while one had a ganglioneuroma and a Malignant tiny round cell tumor. After 3 months (the follow-up period), no change was observed in ADL score compared to pre-operative levels, and no cases of tumor recurrence, infection, or mortality have been recorded.

Conclusions: The lateral retroperitoneal approach is a surgical therapy for lumbar paravertebral tumors that offers a number of benefits, such as operation time is very short, not very much invasive treatments, rapid recovery after surgery, and fewer problems than other surgical approaches.

Keywords: paravertebral tumors, neurosurgery, ADL

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Introduction:

The great majority of lumbar paravertebral tumours seen in the retroperitoneal area are neurogenic in origin. The vast majority of these tumour, accounting for between 0.7% and 2.7% of all retroperitoneal tumours [1, 2], are Schwannomas. Common origins include the spinal cord, namely the dorsal root. Patients with a paravertebral tumour diagnosis are good candidates for surgery as the primary treatment method [3-6]. The conventional posterior midline method involves separating or transversely dissecting the paraspinal muscles to increase surgical exposure; lamina and facet resection is another common treatment used to restore spinal stability following tumour removal. These two methods are used to increase access to further surgical treatments. The tumour may also be removed by what is termed a frontal methodology [4, 6, 7]. Wiltse and coworkers [8] suggested invading the spine via the paraspinal intermuscular space. Afterward, the intertransverse ligament would be cut to get access to the paravertebral region and finally remove the tumour. Time spent in surgery, discomfort from incisions, blood loss, and recovery are all hallmarks of the conventional surgical approach. Surgical techniques as we know them now have been around for millennia. However, most frequent paravertebral tumours are situated close to vital structures like inferior vena cava, the aorta, and other organs, making laparoscopic excision of retroperitoneal tumours a comparatively minimally invasive surgical approach in recent years. In recent years, laparoscopic excision of retroperitoneal tumours has evolved into a comparatively less invasive surgical option. There are a variety of challenges unique to laparoscopic surgery that raise the risk of complications [4, 9-16]. The oblique lumbar interbody fusion (OLIF) surgical procedure was first introduced in 2012, and since then it has undergone extensive improvement and invention at the hands of academics and surgeons [17, 18], the targeted surgical area may now be accessed through a lateral retroperitoneal approach in a minimally invasive manner. Spinal fusion between the oblique vertebrae and the lumbar spine is referred to as an OLIF. Considerable benefits include the fact that it poses little danger to the patient, produces significant results with minimum blood loss, and avoids damaging the spinal column's stability [26-45]. Six instances of lumbar paravertebral tumors will be surgically treated by a lateral retroperitoneal route between May 2020 and November 2021 at Mayo Hospital. The treatment period lasts for two years. The whole thing lasted 19 months. The following is a summary of the reported clinical

results, all of which were positive. The ending is satisfactory.

Methodology:

A retrospective analysis of all instances of lumbar paravertebral tumors that were treated surgically at our institution using a lateral retroperitoneal route between May 2020 and November 2021 was carried out. The time period covered by this analysis was from 2020 to 2021. We included those patients in our study, who met the following criteria.

- 1) The paravertebral tumor is situated behind the peritoneum and external to the spinal canal; also, the intervertebral foramen is clear of any mass of tissue (tumor) that may otherwise be present.
- 2) The part of the lumbar spine where the tumor is located is where it is located.
- 3) Detailed follow-up records.

The following patients were excluded from the study.

- 1) The tumor is located at a level of the spine that is higher or lower than the level of the affected segment, such as the thoracic or sacral spine.
- 2) Lumbar intervertebral foramen and spinal canal tumors.
- 3) Presence of a systemic condition, such as coagulation dysfunction, which precludes surgical intervention.

Details from radiological imaging: Examinations with X-rays, CT scans, and enhanced MRI were performed on each patient in this group. X-rays of the whole spine revealed no abnormalities, and the intervertebral foramen was not enlarged. This was due to the absence of any spinal abnormalities being detected. In order to better comprehend the relationship between the tumour and the skeleton and to identify any erosion or other abnormalities in the skeleton, the CT exam included thin-layer slice scanning and three-dimensional reconstruction. The examination also sought to ascertain whether or not bone degradation had occurred. Simultaneously, the imaging data supplied by the CT scan allowed researchers to gauge the level of spinal stability. A better MRI scan showed that the para-lumbar tumour was not within the spinal canal but rather behind the peritoneum.

Surgical Techniques: The same doctor handles all of these procedures. With the trachea intubated for general anesthesia, the patient will lie on their side (with the afflicted side facing up), with the

jackknife position of the operating table extending the iliac crest and intercostal gap. The imaging technique known as a C-arm allows for the required projection of the lumbar intervertebral space to be acquired and localized on the lateral side of the patient's skin. The skin and subcutaneous tissue were dissected apart in layers, following the direction of the muscular bundles of the external oblique, internal oblique, and transverse abdominal muscles. Starting at the vertebral body's anterior projection and extending anteriorly opposite to the outer oblique muscle, an incision was created. This was done in order to access the vertebral body. The tumor was entirely exposed when the dissector progressively opened up the deep retroperitoneal paravertebral space. Tumor-associated blood arteries and nerves were identified and studied to better understand the tumor's impact on these structures. Cutting the surrounding capsule with a knife, dissecting the tumour along the capsule's inner wall, and cutting the proximal and distal nerve connections are all necessary steps in removing an encapsulated tumour, and the tumour would need to be removed in its entirety. If the tumor is really big, it may need to be cut into sections and removed in stages before it can be completely eradicated. After the retractors had been moved out of the way and the bleeding in the residual cavity had been stopped, the transverses abdominis muscle, the internal oblique muscle, the external oblique muscle, the subcutaneous tissue, and the skin were all meticulously sutured back together. To assess tumor resection, preoperative and postoperative MRIs were compared. At follow-up, patients were scored using the Barthel Index, which takes into account the size of the incision, the amount of blood lost during surgery, and the total time that was spent in the hospital (from admission to discharge). During the course of the follow-ups, the incidence of infection, hernia, and death, in addition to the degree to which the patient's clinical symptoms improved, are recorded and monitored.

Treatment Methodology: In this particular research project, a microsurgical approach to the treatment of lumbar paravertebral tumors was looked at. The operation was carried out via a lateral retroperitoneal methodology, with the following considerations being taken into account at each stage.

a) This minimally invasive lateral retroperitoneal method allows for direct tumor removal while minimizing injury to adjacent tissues by operating in the patient's own interstitial space rather than the more traditional trans-abdominal or trans-muscular routes.

b) Increased postoperative anxiety is associated with procedures that divide abdominal and posterior muscle tissue.

c) With the lateral retroperitoneal approach, the surgical field is unobstructed, and there is plenty of room to work thanks to the use of a surgical microscope. The size and location of the tumor have little bearing on surgical procedures. Additionally, it may prevent the need to go via sensitive anatomical areas like the heart or brain, hence minimizing the risk of injury or other issues. However, surgeons who know how to make the most of their tools may minimize tissue retraction and injuries including those to the ureter, sympathetic nerves, and lumbar plexus.

d) Internal fixation is unnecessary since the lateral method has little effect on spinal stability. It has the potential to lessen the need for implants and cut down on hospital bills.

Surgery Indications:

tumors that develop in the space between the vertebrae of the lumbar spine, called the paravertebral space. The thoracic 12th spine segment is the highest tumor-correspondent level in this set of patients. If it continues upward, the pleura will interfere with the surgery, making it more difficult and increasing the chance of pleural injury. When a tumor is situated too low, the iliac crest might get in the way, reducing the available operating room. Moreover, the abundance of blood arteries anterior to the sacrum raises the surgical risk [19]. The tumor does not invade the spinal canal or the intervertebral foramen. Injuries to the spinal nerve root or cauda equina are more likely to occur during tumour removal if the intervertebral foramen and nerve roots are involved in the procedure. Malignancies form in the retroperitoneal space. The retroperitoneal area allows you a lot of room and flexibility.

Results:

This particular research consisted of five male patients having ages ranging from 20 to 62, with an average age of 41.2 years (standard deviation: 18.2). The in-depth clinical information pertaining to these individuals is shown in Table 1. The relevant segments for paravertebral cancers were found to be para T12-L1 in one case, L1-L2 in one other occasion, L1-L3 in two other instances, and L5-S1 in one instance. There were three illustrations to the left, and there were two illustrations to the right. Patients were found in two cases after a physical examination that did not reveal any symptoms, while patients in two other cases were found via reporting of back discomfort,

1 case through hip pain symptoms, and 1 case through the left waist and calf pain symptoms. Preoperatively, every patient had an ADL score of 100 (Table 2). Three patients were found to have

schwannomas, one patient had a ganglioneuroma, and After surgery, one patient developed a malignant small round cell tumor.

Table 1: Demographics and Medical Presentation of Patients

No.	Age	Gender	Location	Symptoms	Pathology
1	32	Male	L1-3	Pain in Hip	Malignant small round cell tumor
2	20	Male	L5-S1	Pain in Calf and Left Waist	Ganglioneuroma
3	45	Male	L1-3	Pain in Lower Back	Schwannoma
4	28	Male	T12-L1	Nil	Schwannoma
5	62	Male	L1-L2	Nil	Schwannoma

Each patient's postoperative visit included an enhanced MRI. No patients had a recurrence of their tumor, no infections developed in the abdominal cavity or at the incision site, no hernias developed at the incision site, and no patients died

away as a result of their treatment. Following the completion of the surgery, Chemotherapy and radiation were used to treat a tiny round cell carcinoma.

Table 2: Patients' ADL score before and after surgery

Patient	Before Surgery	After Surgery	Follow-up
1	100	95	100
2	100	100	100
3	100	85	95
4	100	90	100
5	100	90	100

According to the results of the follow-up evaluation that was carried out three months after surgery, no noticeable difference was observed in the patient's ADL score from before surgery to after surgery (Table 2). None of the 4 patients had any trouble with their regular activities or with taking care of themselves. One patient reportedly felt very little pain in the area where the procedure was performed.

Discussions:

Schwannomas are the most prevalent kind of neurogenic tumor seen in the retroperitoneal region around the lumbar spine. Five of these instances include neurogenic tumors, and four of them are Schwannomas [1, 2]. It wasn't until the tumor had grown to a substantial extent that its location in the Retroperitoneum was detected. The majority of people didn't show any blatant or distinctive symptoms. Some individuals with Schwannomas, however, had symptoms at the nerve root level. The symptoms reported by the patients in this group ranged from no symptoms to lower back discomfort, hip pain, and pain calf and the left waist in one individual [3-6]. The majority of cases need surgical intervention [6, 9]. Because lumbar paravertebral retroperitoneal tumors are rare and surgical instruments haven't advanced, surgery is the last choice. Patients have higher trauma after

open surgery or trans-muscular Tumorectomy performed using a posterior route [4, 6, 7]. As surgical technology has advanced, minimally invasive procedures have become more refined, and surgeons' skills have grown, the scope of possible surgical procedures has broadened. As long as the tumor is in the right place and is small enough, laparoscopic treatment of retroperitoneal tumors has been used increasingly [9]. Furthermore, when the tumor is situated close to the spine, major blood veins, or organs, it typically calls for a more cautious procedure, increasing the risk of surgery [4, 9]. No cases in this series had intra-operative neurophysiological monitoring (IONM). But we think IONM is crucial when a tumor is wrapping around a nerve root.

Due to the development of the laparoscopic route to the lumbar spine via the lateral retroperitoneal space, surgeons now have a less invasive option for treating tumors in the paravertebral region of the back. His method is similarly effective to laparoscopic surgery in terms of minimizing patient trauma. Paravertebral tumors near major blood veins or other anatomical locations that are difficult to approach may also be successfully treated with this method. The lumbar paravertebral tumors of all these individuals were removed using a lateral retroperitoneal route. An average of (95 ± 50) minutes was spent operating on this group, 32.5

37.6 ml of blood was lost, and the patients stayed in the hospital for an average of (9.2 ± 2.3) days. Infections and hernias were not shown to occur. Minimal stress, shorter operating time, and reduced blood loss are some of the benefits of the lateral retroperitoneal approach for lumbar paravertebral tumor microsurgery [4, 6, 7].

Conclusions:

The lateral retroperitoneal approach to lumbar paravertebral tumor microsurgery offers a number of benefits, including a shorter operating time, less damage to tissue, a speedier recovery, and fewer problems. These benefits are in addition to the fact that the procedure itself takes less time. This surgical treatment will continue to be pushed and exploited in clinical practice as new surgical procedures and instruments become available.

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