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DIAGNOSIS AND TREATMENT OF INTRASPINAL LIPOMAS*

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In this article a 32-case series of intraspinal lipoma localized to the lumbosacral region is presented. All of the patients underwent surgery. Recent reports in the literature indicate that although these lesions show advanced and progressive neurological deficits, very good results can be achieved with surgical treatment.

The advantages of computed tomography in diagnosis and the importance of early surgical intervention and postoperative rehabilitation are emphasized. *Key words: intraspinal lipoma, surgical intervention, rehabilitation.*

Intraspinal lipoma is a lesion localized to the lumbosacral region and characterized by progressive muscle weakness in the lower extremities and sphincter disturbances. This lesion may sometimes cause weakness only in the sphincter muscles[1]. There are some contrary opinions as to the timing of surgical intervention. It is a matter of discussion as to whether surgery should be performed before or after neurological deficits develop. Nowadays, it has become easier to make an accurate and differential diagnosis by means of computed tomography (CT). Detailed information concerning the spinal canal and the mass is very helpful in the timing of surgical intervention[2].

Material and Methods

The study population consisted of 32 patients, 15 males and 17 females with intraspinal lipoma who were examined in the Department of Neurosurgery of the Ankara University Faculty of Medicine between 1976 and 1989.

Fifteen patients (47%) were below two years of age; thirteen patients (40%) were between two-fifteen years of age, and the remaining four patients (13%) were between twelve to fifty-two years of age. All patients were categorized

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according to age group, familial dysraphic conditions, symptomatology and clinical findings. A detailed physical examination of the neurological, dermatological and musculoskeletal systems was carried out to determine skin lesions and neurological deficits.

Neuroradiological investigations were performed using plain roentgenography, myelography and computed tomography.

Surgery was performed on all patients, those with progressive and mild neurological deficits and also those with stable neurological signs. Our aim was to decompress the neural structures and free them from the tethering position. Total excision of the intraspinal part of the lipoma was not attempted in every case. During the operation, we used electrostimulation to prevent possible additional neurological damage, and the non-functional neural elements were excised in order to remove the fixed structures.

An intensive physiotherapy program including active, passive, active-resistive and strengthening exercises and a gait training program was initiated.

Results

Familial dysraphic conditions associated with intraspinal lipoma were not detected in our patients, even though four patients (12%) were products of consanguineous unions.

Various types of skin lesions were present in ten patients (31%) (Table I) and complaints of neurological deficits were present in twenty-two patients (50%). Subcutaneous lipomas were detected in twenty-four patients (75%). Of the other skin lesions, the commonest were dimples (ten cases; 31%). There were no skin lesions in four patients (13%).

TABLE I: 32 Cases of Intraspinal Lipomas and Skin Lesions

	Cases	
Lesions	No. of Cases	Percentage
Subcutaneous mass	24	75
Dimples	10	31
Hemangioma	8	25
Hypertrichosis	3	9
Dermal sinus	3	9
Normal	4	12.1

Twelve patients (37.5%) complained of polyuria, dysuria or constipation. In fourteen patients (43.7%) neurological complaints were of a progressive nature. In the presence of congenital lesions in addition to intraspinal lipoma, patients may show progressive or stable neurological signs (Tables II and III). On examination (Table III) eighteen patients (56.2%) had a motor deficit defined as either weakness or a sphincter disturbance. The others had mild neurological deficits such as reflex changes. In four patients asymmetrical neurological signs were present.

TABLE II: 32 Cases of Intraspinal Lipomas and Associated Congenital Anomalies

Associated Anomaly	No. of Cases
Spina bifida	32
Radicular anomalies	10
Intraspinal cord lesions:	
– Terminal hydromyelia	3
– Teratoma	2
– Dermoid cyst	2
– Diastematomyelia	1
Extraspinal malformations:	
– Genital-anal malformations	2
– Urinary tract malformations	1
– Anal stenosis	1
– Arnold-Chiari (I)	1
– Extremity anomalies	4

TABLE III: Neurological Deficits in Intraspinal Lipomas

Neurological Deficits	No. of Cases
Motor-sphincter disturbance	18
Motor deficit	11
Sphincter disturbance	7
Abnormal reflex (Hypo or hyperactive)	20
Perineal sensorial impairment	14

In the adult group (12%) primary symptoms were related to the neurogenic bladder. If possible, electromyography of the lower extremities and perineum and urodynamic investigations should be added to the neurological evaluation.

Neuroradiological investigations included plain roentgenograms, myelography and CT. Spina bifida was detected in every patient on direct roentgenograms (Fig. 1). When myelography was used alone, only the expansile process within the

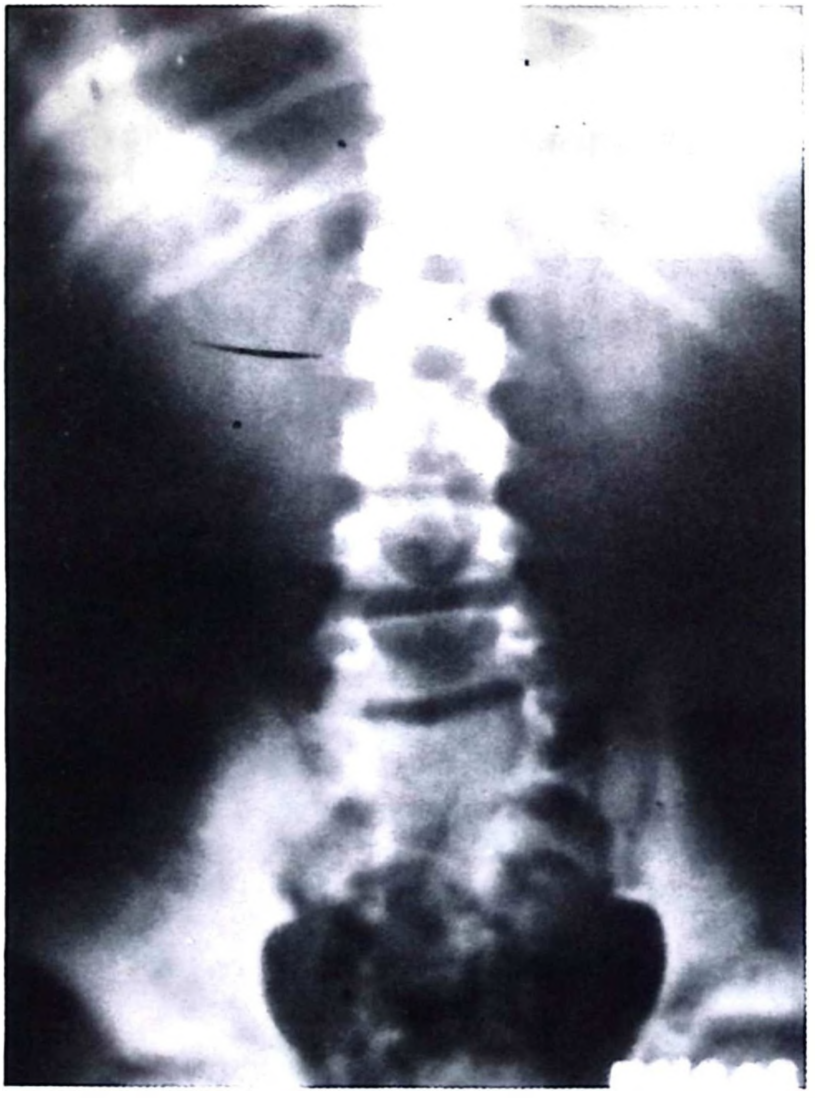

Fig. 1: Spina bifida; on direct roentgenogram of lumbosacral region.

widened spinal canal was identified. As a result of CT investigations, the nature and anatomopathologic position of the masses inside or outside the spinal canal were easily evaluated (Figs. 2-4).

In every patient in our series the conus medullaris was localized downwards and fixed to the lipoma and surrounding tissues with fibrous bands. These fixations

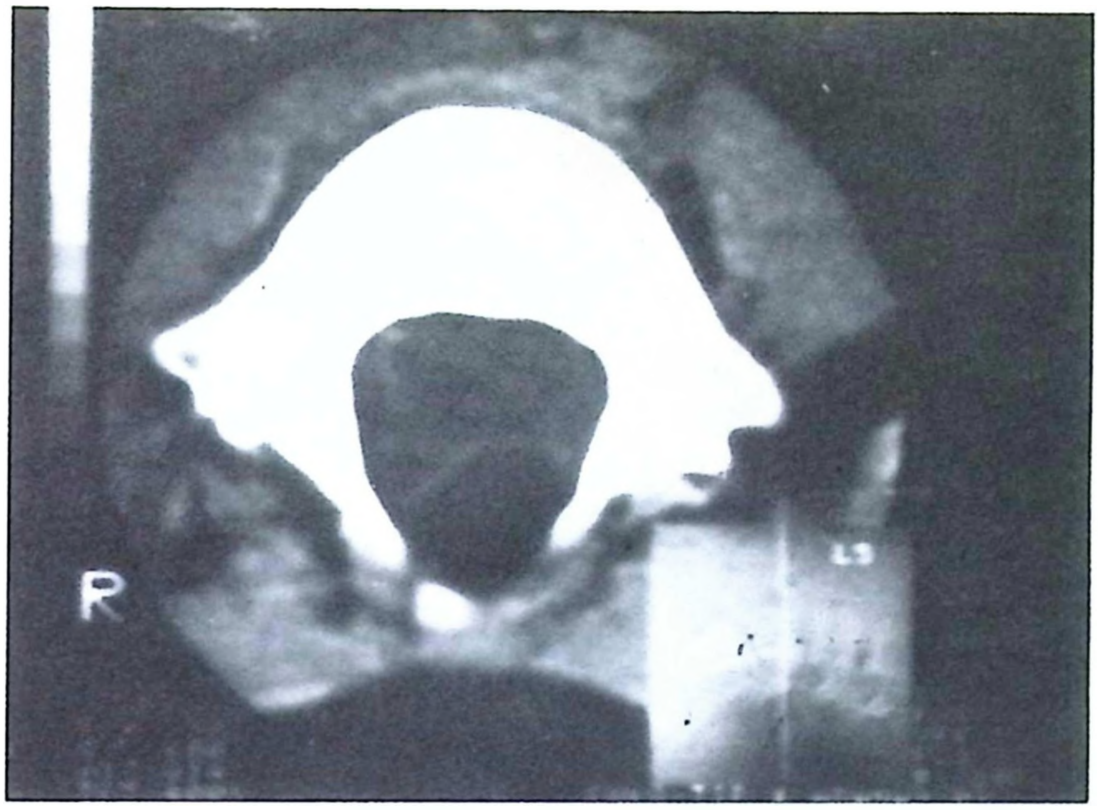

Fig. 2: Spina bifida and intracanalicular lipoma (hypodense) on computed tomography.

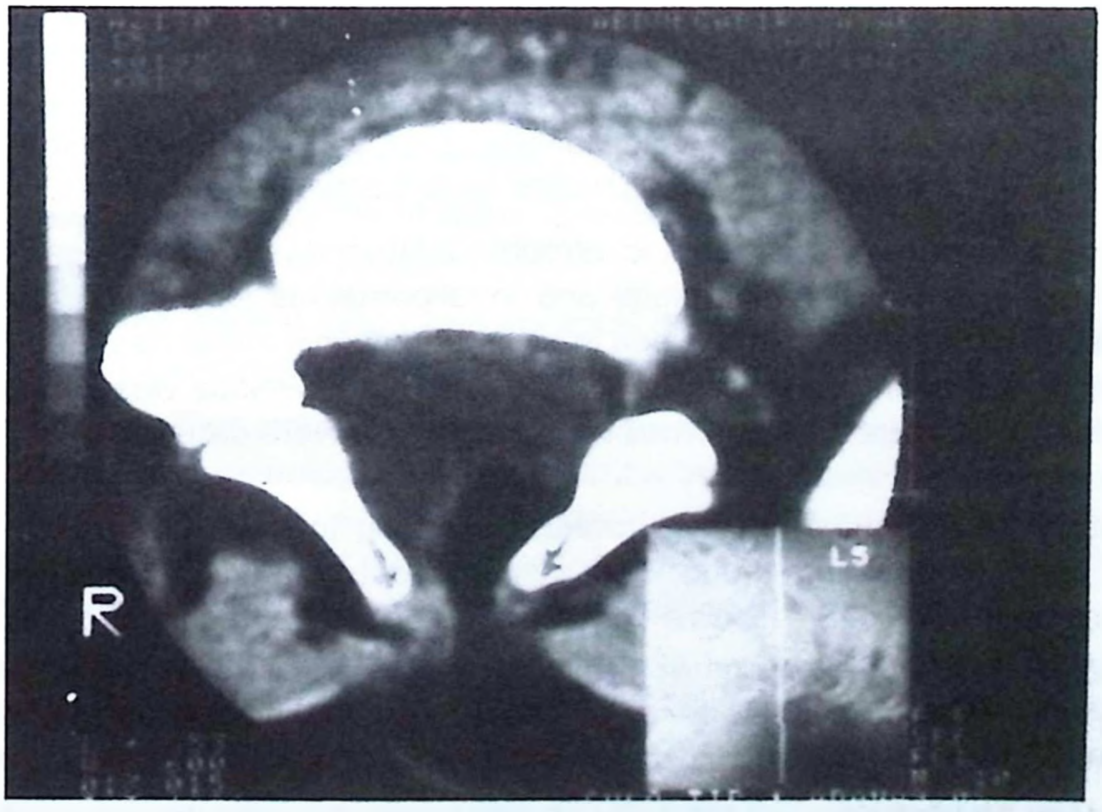

Fig. 3: Epidural lipoma, with extraspinal invasion, on computed tomography.

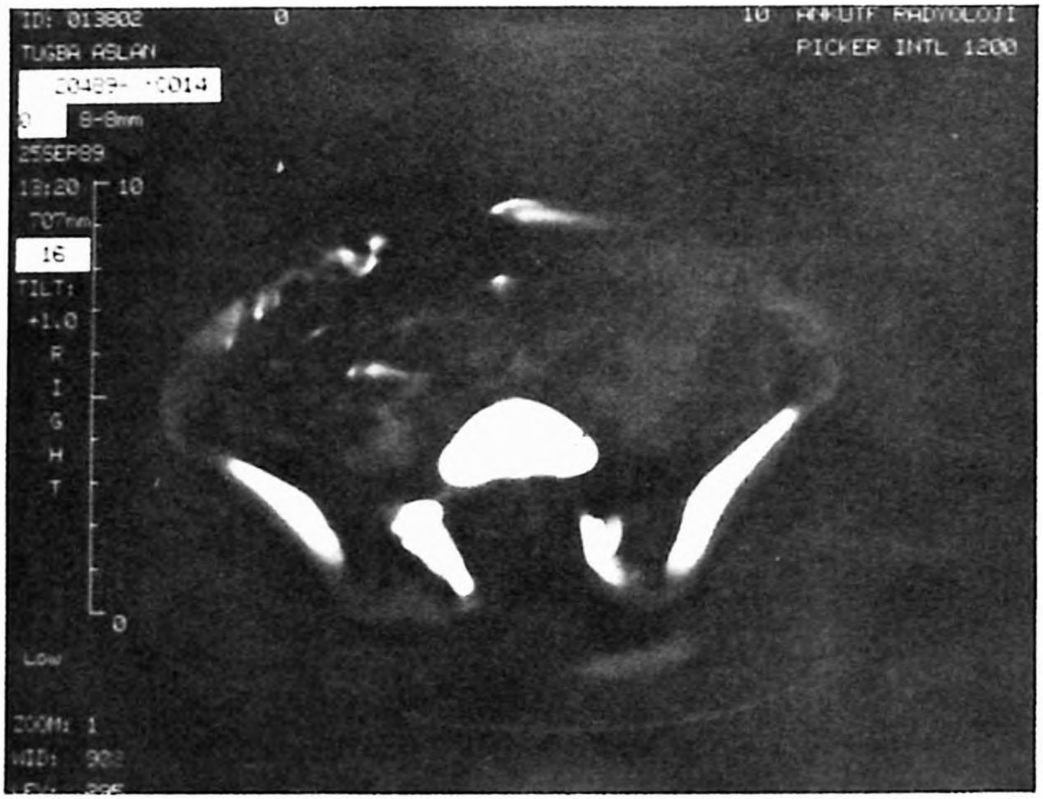

Fig. 4: Subdural lipoma; hypodense lesion spreading out to subcutaneous tissues in the presence of a wide canal defect, on computed tomography.

were detected essentially on the same side as the extremity with the neurological deficits. It was also observed that the neural elements were compressed or fixed. The fixations were detected either by myelography or CT or during surgery. During the operation, morphologic abnormalities and functional disturbances were frequently observed in the patients with congenital anomalies.

Roots were hypertrophic, dystrophic, atrophic, infiltrated with adipose and fibrous tissue and aberrant, with intradural and intralipomatous localization. Electrical stimulation is of help to the surgeon in saving functional structures. Sometimes the excision of neural elements mixed with fatty fibrous tissue was very difficult to perform and, therefore, abnormal neural elements were detected with fibrous tissue as well.

Lipomas were classified into two groups according to their relationship to the nerve roots. In the first group, comprising twenty patients, the roots were localized ventrally to the lipoma-cord surface and as a result of satisfactory excision, untethering (removal of fixation) was possible. In the second group, comprising twelve patients, (37.6%) the roots passed through the lipoma, preventing total excision.

There was no postoperative mortality. In eight patients, subcutaneous collection developed in the postoperative stage. In one of them, a dermal sinus was repaired

by surgical intervention. In the early postoperative stage, additional neurological deficits were detected in three patients (9%).

Preoperative neurological deficits subsided in seventeen patients (53%) and remained the same in twelve patients (37%).

The results were evaluated in the early postoperative stages. Improvements in neurological deficits such as motor and sphincter dysfunctions were observed. Complete improvement was detected after surgical intervention in two patients (6%) with progressive neurological deficits. However, in patients with non-progressive neurological deficits, we could not detect such improvement. There was improvement in the postoperative stage in ten (76%) out of seventeen patients with preoperative progressive neurological deficits and in seven (38%) out of eighteen patients with preoperative nonprogressive deficits. We are not able to give accurate numerical values regarding the future progress of twelve patients whose lipomas were subtotally excised, since they did not return for follow-up examinations.

Eighteen (56.25%) of the patients with motor weakness in the lower extremities also had a neurogenic bladder for which an appropriate rehabilitative approach was undertaken.

Discussion

Intraspinal lipomas are lesions which cause progressive neurological deficits such as paraplegia and incontinence. The risk of neurological disturbances is present in patients of all ages and progresses with the passage of time[3].

According to the literature, there is a higher rate of this tumor occurring in females than in males. In our study, there were 15 males (47%) and 17 females (53.1%), which complied with the above.

In our series, the highest ratio of neurological disturbances was reported as 67 percent which is indicative of spontaneous neurological disturbances.

Families seek medical attention for their children because of the presence of skin lesions rather than neurological deficits. In the adult population, however, the opposite is true. It is not very easy to evaluate the past neurological status of children but it should be kept in mind that they form the highest risk group[4,5]. The main reason for neurological disturbance is tethered cord[6].

These factors may explain the early or late progression of the findings or the sudden onset of disturbances after trauma. In non-traumatic conditions, compression is probably the most important reason for the sudden onset of disturbances.

As a result of biochemical research, it has been demonstrated that in lipomas, accumulation is faster and mobilization is slower when compared to normal

adipose tissue cells[7,8,9]. Therefore, it is found that the metabolism of intraspinal lipoma cells is similar to that of normal adipocytes and that a low-calorie diet may be quite helpful in preventing postoperative recurrences.

If intraspinal lipomas are evaluated neuroradiologically, it is observed that the results of plain roentgenograms and myelograms are not specific for these lesions; they can only enlighten us about the anomalies of bony structures and neural elements. Diastematomyelia and root anomalies are demonstrated by metrizamide myelogram. Computed tomography and magnetic resonance imaging (MRI), in addition to evaluating the type of the tumor, also reveal the presence of tethered cord, other bony anomalies and the extraspinal invasion of the tumour[10,11]. Intraspinal lipomas that appear with low density on CT, show high signal intensity and spike-like superior extension in the spinal canal on MRI[2]. Thus, it seems that CT and MRI are the most informative diagnostic tools. In addition, CT, which offers detailed information about lesions and malformations, substantiates the opinion of surgeons who prefer early surgical intervention.

There are two therapeutic approaches when dealing with spinal lipomas. The first entails a period of observation in which the surgeon monitors the lesion and then performs surgery when neurological deficits appear. This method is preferred by surgeons who wish to avoid postoperative complications and disturbances[5,12]. In our opinion, any delay will give rise to the formation of irreversible neurological deficits. However, neurosurgical intervention may result in a patient being deficit-free but will neither completely cure deformities of the musculoskeletal system, which have already developed, nor prevent their progress[1]. In our series, only two cases out of eighteen with neurological deficits became deficit-free after surgery.

The early postoperative stage has been accepted as being one month. The degree of success of surgical intervention depends on the number and duration of neurological deficits, congenital malformations and related nerve root anomalies. However, after the detection of intraspinal lipoma, the symptoms which may appear at any age may have an insidious onset. The condition of some patients may suddenly deteriorate, such as occurred in two of our patients. Recently, an increasing number of authors have preferred the second method of treatment. They recommend immediate surgical invention after diagnosis, even if the patient is without deficit[3,11,13,14] and emphasize the potential effect of lipomas. Other authors recommend that surgery be performed as early as possible in order to prevent the risk of sudden onset of disturbances in the infantile stages[1,15-17]. We kept these recommendations in mind, especially in regard to our cases in which paraplegia developed suddenly, and took the same decision.

A review of the literature reveals that the results achieved in these patients are much better than in patients that have not been subjected to surgery. Postoperative disturbances can be minimized by electrostimulation[18].

In deficit-free patients prophylactic surgical intervention should be contemplated. In our experience with these cases, we found postoperative neurological disturbances to be 9 percent, which is rather higher than that reported in the literature.

In nonoperated series, this ratio has been reported to be 56 percent[3,12,17].

According to McLone et al[2], the use of the CO_2 laser reduces the operation time and permits more extensive removal of the intramedullary component of these lesions.

Early application of a rehabilitation program in addition to surgical intervention in paraparetic, paraplegic patients are as important as early diagnosis and surgical intervention[9].

Eighteen of our patients with motor deficits also had a neurogenic bladder. The lesion level is very important for the success of a rehabilitation program (Table IV). According to Rusk[21], patients with a lesion level above T_{10} cannot be functional ambulatories, while those with a lesion level below T_{10} can after the implementation of a rehabilitation program. Our results were parallel with those reported by experts[19-21].

TABLE IV: The Lesion Level in Rehabilitated Patients

Lesion Level	No. of Patients
$T_{12}L_1$	2
$L_{1/2}$	2
$L_{2/3}$	2
$L_{3/4}$	4
$L_{4/5}$	5
L_5S_1	3

In our series, according to the results of surgical intervention, the ratio of additional neurological deficits was 9 percent. The development of spontaneous neurological deficits was 67 percent. When we compare these two figures, the importance of early surgical intervention and systematic therapy is clearly understood.

Additional information about the lesion, arrived at by using CT and MRI, is very helpful for surgical intervention.

In addition, electrostimulation and laser facilitate the surgical treatment[2]. The importance of rehabilitation cannot be underestimated or neglected in the treatment of these patients, and it should be remembered that laser, electrostimulation and post-operative rehabilitation encourage surgeons to operate as early as possible on patients with nonprogressive, mild neurological deficits.

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