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**The clinical outcomes after surgical treatment of mass lesions
causing sciatica – a single-center retrospective study**

Клинички резултати након хируршког лечења туморских маса које
узрокују ишијас – ретроспективна студија једног центра

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The clinical outcomes after surgical treatment of mass lesions causing sciatica – a single-center retrospective study

Клинички резултати након хируршког лечења туморских маса које узрокују ишијас – ретроспективна студија једног центра

SUMMARY

Introduction/Objective Sciatica is a disabling pathology with variable etiologies. The most common pathologies arise from discogenic or non-discogenic causes. Mass lesions are a rare cause of extraspinal sciatica, which have been commonly overlooked, leading to unnecessary spinal surgeries, delay in diagnosis or inadequate treatment. There is no standard surgical approach and functional outcomes after surgical treatment of these lesions are not well-known.

The aim of this study is to evaluate clinical outcomes after surgical treatment of mass lesions causing sciatica in different locations.

Methods Data were obtained by a retrospective review from 2015–2020. The mean duration of symptoms at the time of surgery was 10.3 months (3–48 months). The mean age of patients at the time of surgery was 43.8 years (14–73 years). The mean follow-up was 19.5 months (4–50 months). In total, 14 cases had an extrapelvic localization distal to sciatic notch. The other three cases had lesions in the intrapelvic area, including left sciatic notch (1), right acetabulum (1), sacroiliac and lumbosacral region (1). None of the patients had palpable masses. Transgluteal, infragluteal, lateral, and posteromedial approach were used depending on location and size of the lesion.

Results At the final follow-up, all patients recovered pain relief. The median musculoskeletal tumor society score was 90% (70–100). There was no recurrence at the latest follow-up.

Conclusion Our study demonstrated that early detection by neurological examination and radiological work-up can avoid unnecessary surgeries, enable early surgical treatment of tumoral mass with satisfactory clinical outcomes. The surgical approach should be individualized according to location and size of the lesion.

Keywords: Mass lesions, sciatic nerve, non-discogenic sciatica, transgluteal approach, infragluteal approach

САЖЕТАК

Увод/Циљ Ишијас је онеспособљавајућа патологија са променљивом етиологијом. Најчешће патологије настају због дискогених или недискогених узрока. Туморске масе су редак и често занемарен узрок екстраспиналне болести ишијаса, што доводи до непотребне операције кичме, закаснелог дијагностиковања или неадекватног лечења. Не постоји стандардни хируршки приступ, а функционални исходи након хируршког лечења ових лезија нису довољно познати.

Циљ ове студије је процена клиничких резултата након хируршког лечења туморских лезија које изазивају ишијас на различитим локализацијама.

Метод Подаци су добијени ретроспективном анализом документације лечених између 2015. и 2020. године. Просечно трајање симптома пре операције било је 10,3 месеца (3–48 месеци). Просечна старост пацијената у време операције била је 43,8 (14–73 године). Просечно праћење је било 19,5 месеци (4–50 месеци). Четрнаест случајева је имало екстрапелвичну локализацију дистално од горњег седалног уреза. У остала три случаја лезије су биле присутне у интрапелвичном подручју, и то леви горњи седални урез (1), десни ацетабулум (1), сакроилијакални и лумбосакрални (1). Ниједан од пацијената није имао опипљиву масу. У зависности од локализације и величине лезије примењивани су трансглутеални, инфраглутеални, бочни и постеромедијални приступи.

Резултати На последњој контроли, примећено је ублажавање болова код свих пацијената. Средњи МСТС резултата је 90% (70–100). На последњој контроли није било рецидива.

Закључак Наше истраживање је показало да рана дијагноза неуролошким прегледом и радиолошким студијом може спречити непотребне операције и омогућити рано хируршко лечење туморске масе са задовољавајућим клиничким резултатима. Хируршки приступ треба индивидуализовати у складу са локацијом и димензијама лезије.

Кључне речи: Туморске масе, ишијадикус, недискогени ишијас, трансглутеални приступ, инфраглутеални приступ

INTRODUCTION

Sciatica is a frequently encountered complaint and described as the pain along the course of the sciatic nerve [1, 2]. It is characterized by pain radiating downward from the lumbar region to the posterior thigh. Lumbar disc herniation, spinal stenosis, and piriformis syndrome are among the most common causes; however less common extraspinal pathologies are of infective, inflammatory, tumoral and vascular origin which include soft tissue and bone tumors, hematomas, presacral abscesses, aneurysms, sacroiliitis, and gynecological conditions such as endometriosis and tubal-ovarian abscesses [3, 4, 5].

The wide variety of extraspinal causes of sciatic nerve entrapment can be overlooked since the size of the tumor had to become enlarged enough to violate the greater sciatic foramen. Also, the increased sensitivity of magnetic resonance imaging leads to misdiagnosis of discogenic sciatica [5]. Hence, differential diagnosis could be compelling and should be meticulously made. Nevertheless, an incidental finding on pelvic or femur x-ray can reveal the leading cause of non-discogenic sciatica. MRI is the best modality to delineate pelvic and gluteal lesions. Physical examination and detailed patient history with the awareness of the possible mass lesions aids in early diagnosis and surgical treatment. Understanding the etiology of intra- and extrapelvic causes requires a comprehensive approach for diagnosis and management.

The aim of this study is to evaluate clinical outcomes after surgical treatment of mass lesions causing sciatica in different locations.

METHODS

Informed consent was obtained from all patients for being included in the study. The study protocol was approved by the Local Ethics Committee. (No: 2020/0516 Date: 55 12.08.2020). Data were obtained by a retrospective chart review from 2015-2020. A

retrospective review was made of 17 patients who were treated surgically for mass lesions with sciatica. All 17 cases, six females and eleven males were aged between 14 and 73 years old.

In extrapelvic lesions, surgical procedures were performed by using transgluteal (n = 5), infragluteal (n = 5), lateral (n = 2), and posteromedial (n = 2) approach, depending on the location and size of the mass lesion. Intrapelvic lesions were managed using different approaches: One patient with cyst hydatid at the left sciatic notch underwent a two-stage transabdominal approach followed by transgluteal incision. One patient with non-ossifying fibroma underwent curettage and grafting using the posterior sacral approach. The last patient underwent periacetabular resection and reconstruction with a saddle prosthesis.

Statistical analysis

Descriptive statistics was done was done by using the IBM SPSS20. The median values were given with ranges, minimum, and maximum. The mean values were given with standard deviation.

RESULTS

Demographic data

Details regarding extrapelvic and intrapelvic lesion are summarized in Table 1 and Table 2. The mean age was 43.8 years (range: 14–73 years). The mean duration of symptoms was 10.3 months (range: 3–48 months). The mean follow-up was 19.5 months (range 4–50 months). The median Musculoskeletal Tumor Society score was 90% (range,70–100). 14 lesions had an extrapelvic localization distal to sciatic notch. The other three lesions were in the intrapelvic area, including left sciatic notch, right acetabulum, sacroiliac and lumbosacral region. None of the patients had palpable mass.

Clinical findings

None of the patients had a well-delineated palpable mass. Remarkably, all patients experienced low back pain or buttock pain. Pain was not responding to analgesics in all patients. In extrapelvic localizations, there was positive Tinel's sign at gluteal region over the course of sciatic nerve and tenderness after deep gluteal palpation. There was no weakness, gait dysfunction, motor and sensorial deficit. The localization of all lesions with specific etiology was demonstrated by MRI. Therefore, no preoperative EMG was performed.

Pathologic diagnosis

The diagnosis of the lesions includes osteochondrolipoma of soft tissue, soft tissue chondroma (n = 1), sciatic nerve hemangioma (n = 1), intramuscular lipoma (n = 1), atypical lipoma (n = 2), schwannoma of the sciatic nerve at the level of ramus pubis inferior (n = 1) and sciatic notch (n = 1), low-grade fibrosarcoma (n = 1) (Figure 1), solitary plasmacytoma of ischion (n = 1) (Figure 2), tenosynovial giant cell tumor (n = 1) (Figure 3), osteochondroma of the femoral neck (n = 2) (Figure 4), cyst hydatid (n = 1) (Figure 5), metastatic acetabular lesion of lung carcinoma (n = 1) (Figure 6), soft tissue metastasis of squamous cell carcinoma (n = 1), and non-ossifying fibroma of the sacrum (n = 1).

Surgical approach

Transgluteal, infragluteal, lateral, and posteromedial approach were used depending on location and size of the mass lesion. In proximal sciatic nerve lesions at the level or below the sciatic notch, an infragluteal or a transgluteal approach was used (Table 1) If there is suspicion about malign lesion, infragluteal approach was done in lesions to obtain wide exposure with safe surgical margins and avoid intracompartmental contamination. In this approach, the gluteus maximus muscle is detached from iliotibial band and reflected medially.

The lesion is dissected from the sciatic nerve with wide excision. In possible benign lesions, the transgluteal approach was preferred. In this approach, gluteus maximus was splitted to enhance access to the sciatic nerve. In intrapelvic lesions, one patient with cyst hydatidic underwent classical transabdominal at first stage and transgluteal approach at second stage. (Table 2) For intrapelvic lesions anterior to sacrum transabdominal either using intraperitoneal or retroperitoneal approach may be used. Among intrapelvic lesions, one patient with nonossifying fibroma at right femoral neck underwent transgluteal approach. One patient with fibrosarcoma at right gluteal area underwent infragluteal approach. One patient with cyst hydatidic underwent transabdominal approach. One year later, the same patient underwent transgluteal approach due to residual lesion. In all cases, no intraoperative neuromonitoring is needed as sciatic nerve was protected.

Follow-up

In benign lesions, the patients were followed every six months for the first two years, and annually after that. In malign lesions, the patients were followed every three months for the first two years, and annually after that.

DISCUSSION

To our knowledge, the current study is the third-largest series after Sim et al. (38 cases) and Bickel et al. (32 cases), which report space-occupying mass lesions with sciatic pain [4, 6].

Bickels presented 32 cases with various etiologies of benign and malign lesions [4]. The average of symptoms was 11.9 months (range, 1–59 months) at the time of diagnosis, which is similar to our study. The predominance of malign lesions in the same series underlines the importance of detailed physical examination and patient history. Sim reported

on 38 patients, 37 of which (14 benign, 23 malign) presented with sciatic pain [6]. He emphasized that tumoral lesions and lumbar disc hernia can have similar presentations with low-back pain and sciatica. The duration of symptoms varied from 2 to 58 months again similar to our findings. Different from these series, we encountered rare pathologies with non-palpable masses such as sacral melanocytic schwannoma, low-grade fibromyxoid sarcoma, solitary plasmacytoma, soft tissue metastasis of squamous cell carcinoma, non-ossifying fibroma, osteochondrolipoma and chondroma and cyst hydatid; however, the surgical strategy favoring complete removal is valid and paramount irrespective of diagnosis.

Other reports were limited to few case series and presentations [1, 2, 7–10]. Guedes et al reported on six patients with non-discogenic sciatica due to extrauterine endometriosis (one case) and tumoral lesions (five cases) three of whom (metastatic rectal adenocarcinoma, low-grade sarcoma, high-grade sarcoma) had malign lesions. He obtained clinical improvement after wide resection [2]. All lesions were deeply located and unpalpable similar to our cases. Kulcu et al. presented eleven patients with non-discogenic sciatica which includes two mass lesions, including schwannomatosis (case 2) and angiosarcoma (case 8) [1]. Matsumoto treated eight patients with sciatic notch dumbbell malign tumors who suffered from sciatica without back pain [9]. Other types of lesions which are more frequently identified lesions in previous studies include pelvic heterotopic ossification, granulocytic sarcomas, osteochondromas, and ganglion cysts [7, 8, 10]. In line with these studies, we also demonstrated that sciatica can be present in extraspinal mass lesions.

Oncologic principles must be applied for all mass lesions compressing sciatic nerve since these lesions can have a malign component, which leads to unplanned resections, as evident in the existing literature. Diagnostic workup should start with detailed history taking and physical examination. The previous diagnosis of cancer and surgical history should be asked. Pain characteristics like constant or intermittent, related to activity or progressive

should be noted.

Palpation of the sciatic notch and piriformis muscle eliciting pain should prompt us for possible mass lesion compressing the sciatic nerve. However mass lesions may be non-palpable due to obesity. X-rays and imaging modalities including USG, CT, and MRI should be ordered when deemed necessary.

The surgical approach must be individualized according to the location and size of the lesion [11, 12]. The aim is to obtain enhance exposure. Various approaches depending on the location of the mass lesion and experience of the surgeons may be performed, providing safe surgical margins can be accomplished after resection. For proximal sciatic nerve lesions at the level of sciatic notch either an infragluteal or transgluteal approach may be utilized. During infragluteal approach, gluteus maximus muscle is detached from iliotibial bant and reflected medially; however, transgluteal approach provides access to the sciatic nerve by splitting the gluteus maximus muscle. For intrapelvic lesions anterior to sacrum transabdominal either using intraperitoneal or retroperitoneal approach may be used. In our study, we preferred different approaches. Predominantly, if the lesion is suspected to be malign, we prefer infragluteal approach rather than transgluteal approach to achieve wide surgical margins and avoid intercompartmental contamination.

To note, the size of lesion varies until the patient becomes symptomatic. In intrapelvic lesions, we observed more larger lesions compared to extrapelvic lesions. This should alert clinicians in intrapelvic lesions with a possible malign diagnosis.

Regarding neuromonitoring, there is no standard use in extraspinal bone and soft tissue tumors. Although it is commonly preferred in spinal surgery, there is no need in our cases as sciatic nerve is identified and preserved during tumor excision. Also, one recent study regarding the use of neuromonitoring in spinal cord tumors concluded that neuromonitoring do not take the role of replace clinical judgment and other perioperative

information [13].

Study limitation

The small sample size, retrospective design and heterogeneity of pathologic diagnosis are major limitations of this study. Due to unequal numbers of intrapelvic (14 cases) and extrapelvic lesions (three cases), no statistics was applied. There is no preoperative and postoperative electrodiagnostic values to evaluate the effect of various surgical approaches on clinical improvement. However, all patients obtained dramatic clinical improvement. This study with these limitations will underline the need for further studies regarding the decision for surgical approach in various localizations.

CONCLUSION

Diagnostic algorithm should include detailed physical examination and radiologic imaging including pelvic and thigh area to detect mass lesions as extraspinal causes of sciatica. Patients who suffered from failed back surgery syndrome, and having persistent and progressive clinical symptoms despite physical or medical therapy should be investigated for a possible mass lesion which may be compressing the sciatic nerve. This will further avoid unnecessary and unsuccessful spinal surgeries.

Conflict of interest: There are no conflict of interest

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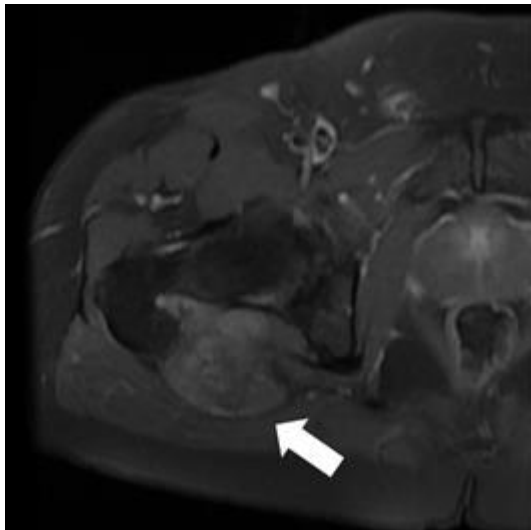


Figure 1. (Case 3) 49-year-old male with low-grade fibromyxoid sarcoma; Pelvic magnetic resonance imaging demonstrated a sharp and lobulated contoured $8 \times 7 \times 3.5$ cm lesion extending between the right gluteal muscle fibers close to the trochanter major with heterogeneous enhancement; the sciatic nerve is encroached by the lesion (white arrow)

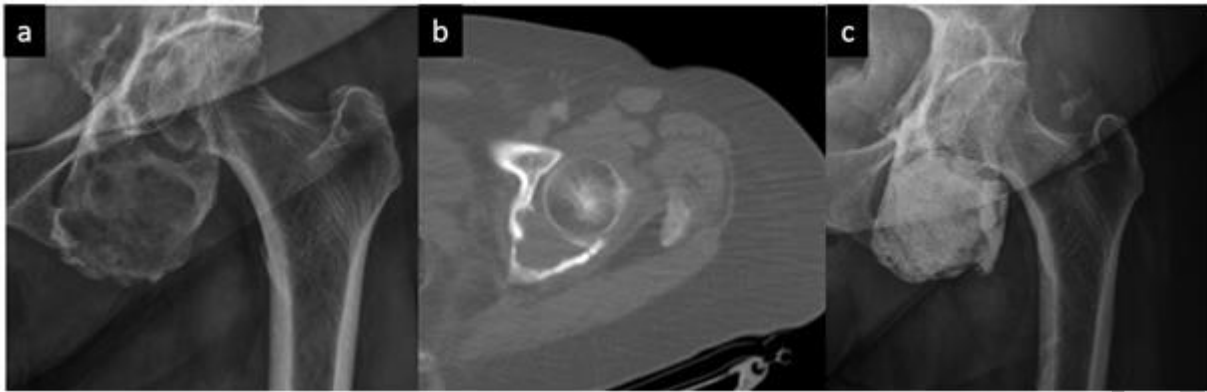


Figure 2. (Case 4) 64-year-old female with solitary plasmacytoma; a – preoperative X-ray; b – computed tomography view demonstrates an expansive lytic lesion extending from the posteroinferior part of the left acetabulum to inferior ramus pubis; c – five-year follow-up radiograph after curative resection and bioceramic antibacterial grafting shows graft consolidation

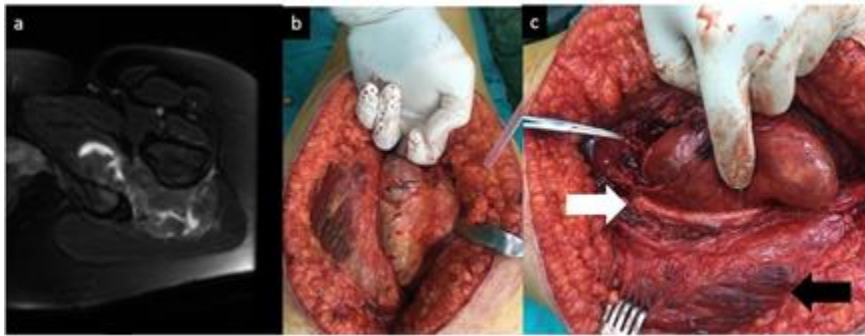


Figure 3. (Case 10) 36-year-old female with tenosynovial giant cell tumor; a – magnetic resonance imaging demonstrated a $10 \times 5 \times 20$ cm nondestructive lesion; b – wide excision was performed using infragluteal approach; c – intraoperative view shows the close proximity of tumor to sciatic nerve (white arrow: sciatic nerve black arrow: gluteus maximus)



Figure 4. (Case 14) 34-year-old male with osteochondroma; preoperative three-dimensional computed tomography view showing mass lesion at posterior femoral neck

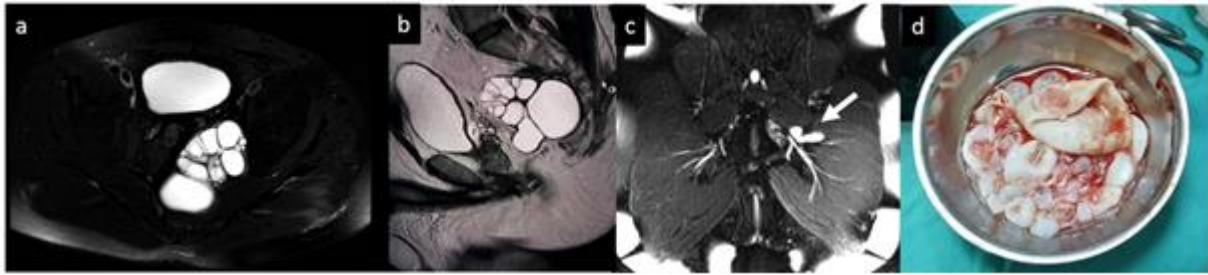


Figure 5. (Case 15) 35-year-old male with hydatid cyst; a and b – preoperative magnetic resonance imaging before the first surgery, which shows multiloculated septated cystic lesion at the presacral area; c – the patient presented to our clinic one year postoperatively; magnetic resonance imaging demonstrated a 43×14 mm lesion inferior to left piriformis muscle between gluteus medius and maximus (white arrow); d – intraoperative view of daughter cysts

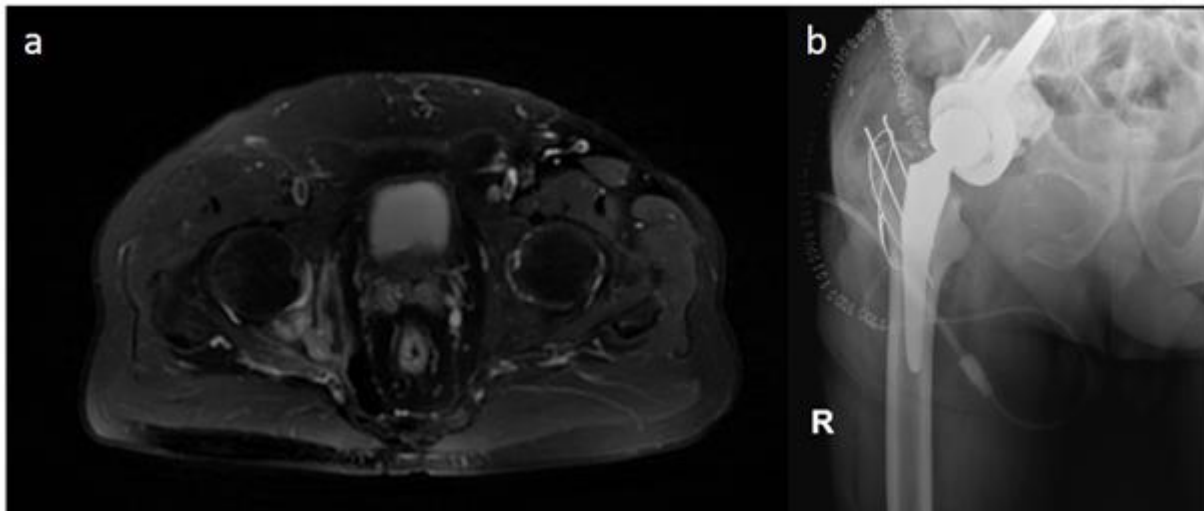


Figure 6. (Case 17) 73-year-old male with a metastatic lesion at right posterior acetabulum due to lung metastasis; a – magnetic resonance imaging; b – X-ray view after periacetabular resection and endoprosthetic reconstruction

Table 1. Details about extrapelvic lesions

Case	Age (years)	Gender	Primary diagnosis	Previous misdiagnosis	Symptoms	Symptoms' duration (months)	Lesion size on MRI (cm)	Lesion location	Surgical approach	Follow-up (months)	MSTS score (%)
1	20	Female	Hemangioma	None	Pain	3	6x5x5	Right ischium	Transgluteal	19	100
2	28	Male	Hereditary multiple osteochondromas	None	Pain, antalgic gait	12	8x6x6	Right femoral neck	Transgluteal	21	80
3	49	Male	Low grade fibrosarcoma	Spinal stenosis	Pain	6	8x7x3.5	Right gluteal area	Infragluteal	48	85
4	64	Female	Solitary plasmacytoma	Lumbar radiculopathy	Pain, paresthesia	12	5x6x5	Left gluteal area	Infragluteal	50	90
5	28	Male	Schwannoma	None	Pain	5	5x2x5	Right hip pain	Transgluteal	10	90
6	37	Male	Schwannoma	None	Sciatica	4	3x1x2	Left gluteal area	Lateral	10	90
7	42	Female	Soft tissue chondroma	None	Hip pain	48	8x6x5	Left posteromedial femur	Posteromedial	17	100
8	40	Female	Osteochondromatous lipoma	None	Hip pain	6	6x5x3	Right proximal femur	Infragluteal	25	100
9	65	Female	Lipoma	None	Sciatica	6	4x3x5	Right proximal femur	Transgluteal	6	80
10	36	Female	Tenosynovial giant cell tumor	None	Hip pain, sciatica	18	10x5x20	Left posterior hip	Infragluteal	6	80
11	41	Female	Atypical lipomatous tumor	None	Thigh pain	4	5x4x5	Left thigh	Posteromedial	6	80
12	64	Female	Soft tissue metastasis of squamous cell carcinoma	None	Gluteal pain	2	3x2x3	Left gluteal area	Infragluteal	4	70
13	65	Female	Atypical lipomatous tumor	None	Hip pain paresthesia	3	12x20x9	Left gluteal area	Transgluteal	6	80
14	34	Male	Osteochondroma	None	Pain, paresthesia	24	4x3x4	Right posterior femoral neck	Transgluteal	6	100

MRI – magnetic resonance imaging; MSTS – the musculoskeletal tumor society

Table 2. Details about intrapelvic lesions

Case	Age (years)	Gender	Primary diagnosis	Previous misdiagnosis	Symptoms	Duration of symptoms (months)	Lesion size on MRI (cm)	Lesion location	Surgical approach	Follow-up (months)	MSTS score (%)
15	35	Male	Cyst hydatid	Lumbar disc herniation	Pain, paresthesia	12	7.5x6x8.5	1. Presacral area 2. Right ischium	Two stages: 1. Transabdominal 2. Transgluteal	30	100
16	14	Female	Non-ossifying fibroma	None	Pain, paresthesia	18	3x2x3	Right femoral neck	Transgluteal	6	100
17	73	Male	Low grade fibrosarcoma	Spinal stenosis	Pain	6	8x7x3.5	Right gluteal area	Infragluteal	48	70

MRI – magnetic resonance imaging; MSTS – the musculoskeletal tumor society

Paper accepted