folia medica

Folia Medica 66(6):911-916
DOI: 10.3897/folmed.66.e126479

Case Report

Post-Operative Gigantic Lumbar Pseudomeningocele: A Case Report

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Received: 29 April 2024 ♦ **Accepted:** 12 June 2024 ♦ **Published:** 31 December 2024

Citation: Fermeli D, Panagiotopoulos V, Papadakos D, Theofanopoulos A, Zampakis P, Constantoyannis C. Post-operative gigantic lumbar pseudomeningocele: A case report. Folia Med (Plovdiv) 2024;66(6):911-916. doi: 10.3897/folmed.66.e126479.

Abstract

Postoperative pseudomeningocele is a rare, but still existing, complication after spinal surgeries. It may be asymptomatic or presented with back pain, radicular pain or headaches. Many pseudomeningoceles resolve spontaneously, others require revision surgery with dural repair. We present a female patient who underwent duroplasty treatment for a massive postoperative lumbar pseudomeningocele measuring 22.57 cm in length after broad laminectomy. A 71-year-old female with previous thoracolumbar T10-L5 instrumentation surgery, underwent a L2-5 broad laminectomy due to severe canal stenosis at the L2-5 level. Intraoperatively, an accidental spotted durotomy occurred at the level of L4-5. Primary repair was not feasible, so artificial dura was placed. Postoperatively the patient presented with cerebrospinal fluid (CSF) leak, which was treated with external lumbar drain and bedrest. Three months later, our patient presented to our outpatient clinic with a large 15 cm long bulging mass at the surgical site without any neurological deficit. A lumbar CT scan was conducted and a gigantic lumbar pseudomeningocele of 22.57 cm length and 6.29 cm width from the level of T11 to S2 was observed. We performed a revision surgery with duroplasty and there was no recurrence of CSF leak or pseudomeningocele after 7 months follow-up.

Pseudomeningoceles are rare post-operative complications. Although treatment options are controversial, they should be recognized soon enough in order to avoid central nervous infections, neurological deficits and further comorbidities.

Keywords

duroplasty, post-operative lumbar pseudomeningocele, revision surgery

INTRODUCTION

Pseudomeningocele consists of an extradural collection of cerebrospinal fluid (CSF) after spinal surgeries at the site of the wound and the cause is frequently iatrogenic. The incidence of pseudomeningoceles following spinal lumbar surgeries varies between 0.07%–2%.[1] Incidental or iatrogenic durotomy has been estimated to occur in 1% to 17% of spinal surgery cases.[2] They may be asymptomatic or present with back pain, radicular pain, nausea, dizziness or headaches.[3] Pseudomeningoceles more than 8 cm in size are described as giant pseudomeningoceles and those more than 5 cm as large.[2] MRI scan is the gold standard for diagnosis as pseudomeningoceles appear hypointense on T1 weighted sequences and hyperintense on T2 weighted sequences respectively.

Management options for pseudomeningoceles are debatable. Small or medium-sized and asymptomatic ones shall be observed and treated conservatively, as they may resolve spontaneously.[4] In symptomatic patients though, revision surgery may be required to repair the CSF leak and

treat caused symptoms. A few case reports are found in the literature and our aim is to add our experience and repair method to the existing literature.[2-8]

CASE REPORT

Pre-operative course

A 71-year-old female patient with a history of hypertension, hyperlipidemia, depression, increased body mass index and previous thoracolumbar T10-L5 instrumentation surgery, underwent a L2-5 broad laminectomy in June 2021 due to severe canal stenosis at L2-5 level. Previously, the first instrumentation was performed in a different neurosurgical clinic a few years ago due to degenerative spondylolisthesis without any referred clinical or imaging stenosis at that time. Intraoperatively, an accidental spotted durotomy occurred at the level of L4-5. It was not feasible to be sutured as we did not have direct view of the leak, we guess our maneuvers or a bony spur caused the tear laterally. Artificial dura was placed throughout the levels of laminectomy as well as glue. Postoperatively, the patient presented with CSF leak from the wound, fever, headache, nausea and low back pain. After four days of immobilization with no resolution of CSF leak, we placed an external lumbar drain and the patient was kept in bedrest for 16 days in total. Antibiotics were administered for 18 days overall. Laboratory blood and CSF tests came back normal and no pathogen was found in CSF cultures. After 18 days of hospitalization our patient was discharged afebrile, fully mobilized, without low back pain and CSF leak.

Three months later, our patient presented to our outpatient clinic with a small edema at the site of operation and low back pain without any neurological defect. A lumbar CT scan was conducted and a gigantic lumbar pseudomeningocele was observed as shown in ***Fig. 1****. Its length was 22.57 cm and width – 6.29 cm arising from the level of T11 to S2. We proposed surgical treatment for this complication at the time of diagnosis, which the patient initially refused. She finally consented to the operation 6 months afterwards.*

Surgery

During these 9 months after the laminectomy, the patient developed a large 15 cm long bulging mass over the surgical site which reached the skin. We performed a revision surgery with duroplasty. Right underneath the vertical skin incision, the pseudocelic sac/membrane was found stretched and bulging. A vertical incision at the sac was made and a large amount of yellowish CSF was drained and sent for laboratory tests and CSF cultures. After complete CSF drainage and removal of the previous artificial dura, no dura tear was observed, not even after Valsalva maneuvers. ***Figs 2A-2C*** *show thoroughly the steps of wound closure. Dural integrity was augmented with sufficient layers of fibrin glue sealant, subcutaneous adipose tissue and new artificial dura. We also performed an additional parallel paramedian lumbar incision and retrieved the subcutaneous adipose tissue we needed. Afterwards, 2.0 vicryl watertight sutures of muscle fascia and subcutaneous tissue were placed in multiple layers. The skin was closed with 2.0 Nylon sutures. Routine postoperative antibiotics were administered. At the first postoperative day, the patient presented with a 38°C fever. After complete investigation, the fever was attributed to percutaneous thrombophlebitis. The remaining postoperative course was uneventful. She was discharged after 7 days afebrile and fully mobilized. At the 7-month follow-up, there was no pseudomeningocele appearance in MRI as shown in* ***Fig. 3*** *as well as no bulging lumbar mass as shown in* ***Fig. 4****.*

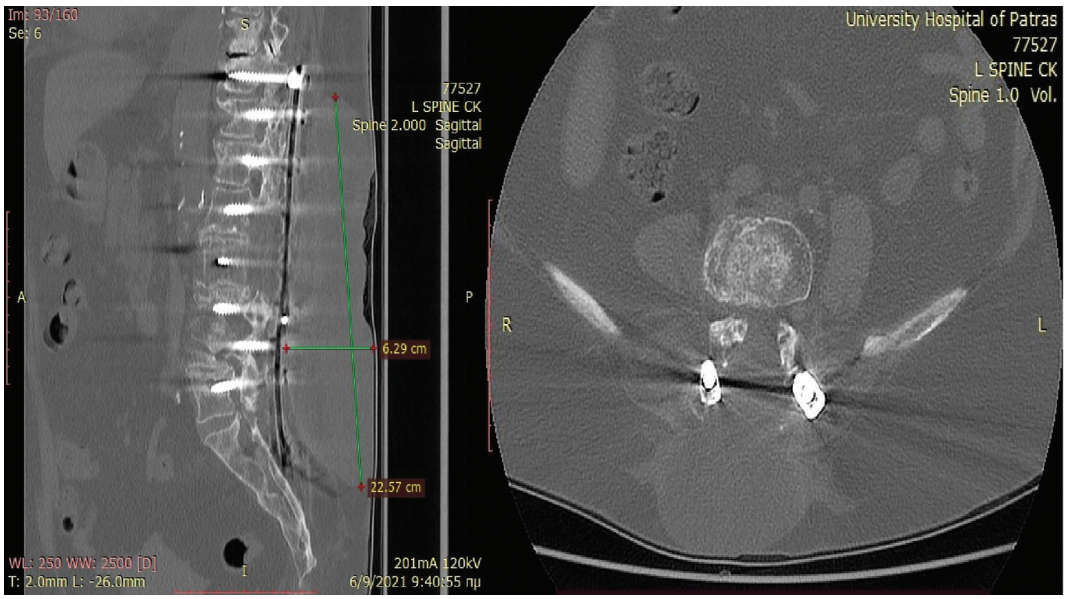

Figure 1. Preoperative lumbar CT scan showing pseudomeningocele 22.57×6.29 cm in size.

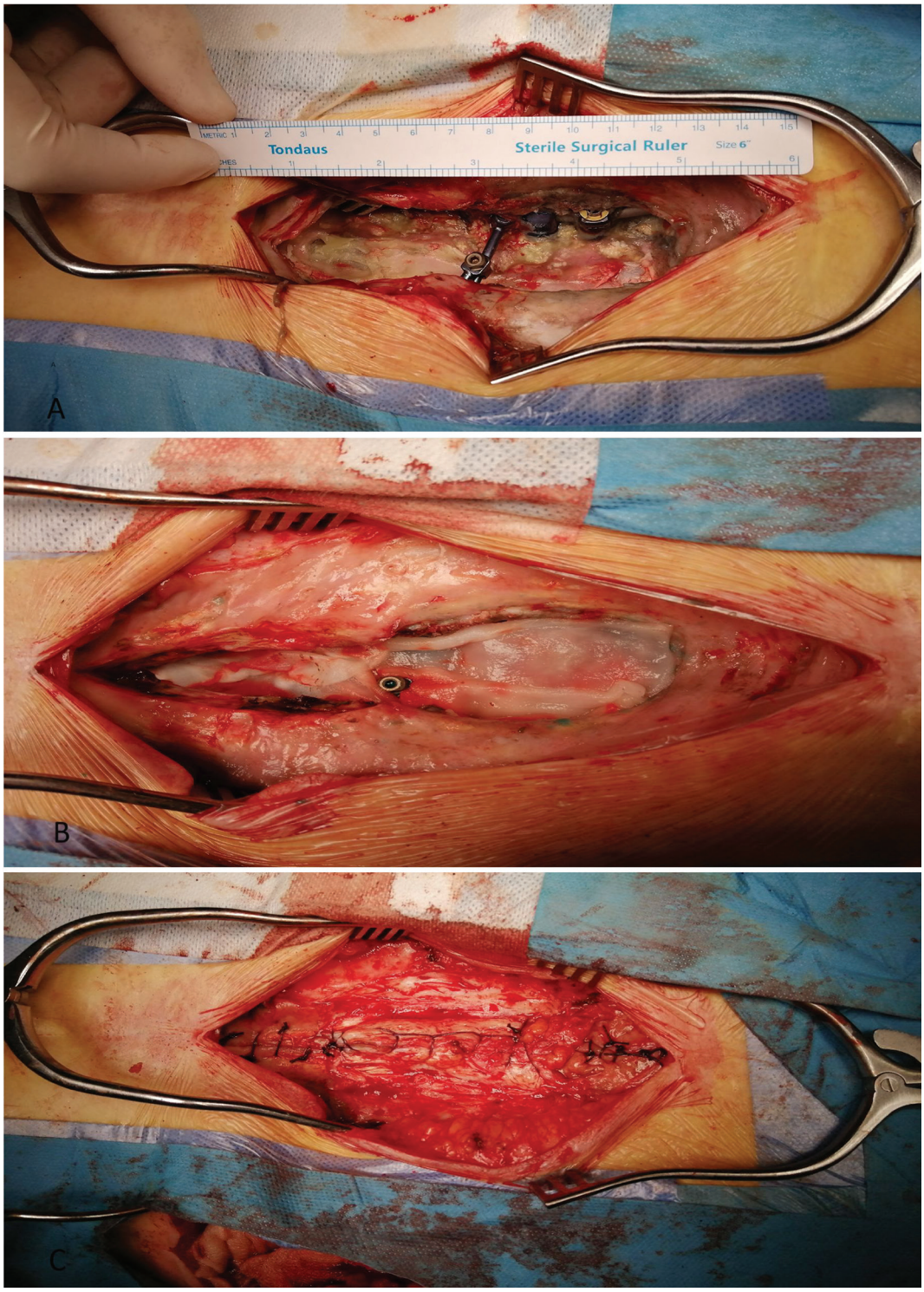

Figure 2. Intraoperative stages of packing and wound closure. **A:** A full view of the previous instrumentation surgery without any obvious CSF leak at any surgical site; **B:** Complete coverage with artificial dura; **C:** Watertight sutures using percutaneous adipose tissue underneath and in between the muscle fascia, which extended in multiple layers in anatomical order with 2.0 Vicryl sutures.

DISCUSSION

Pseudomeningoceles develop when breach of the dura and the arachnoid layers occurs and CSF leaks into the paraspinal tissues. Unrepaired small dural tears with an arachnoid breach may result in one-way CSF flow like a valve mechanism. This valve mechanism leads to the formation of a cyst surrounded by fibrous connective tissue overtime.[6,8] When the leak is continuous and there is free space, a fibrous cystic wall develops forming an evolving cavity filled with CSF.

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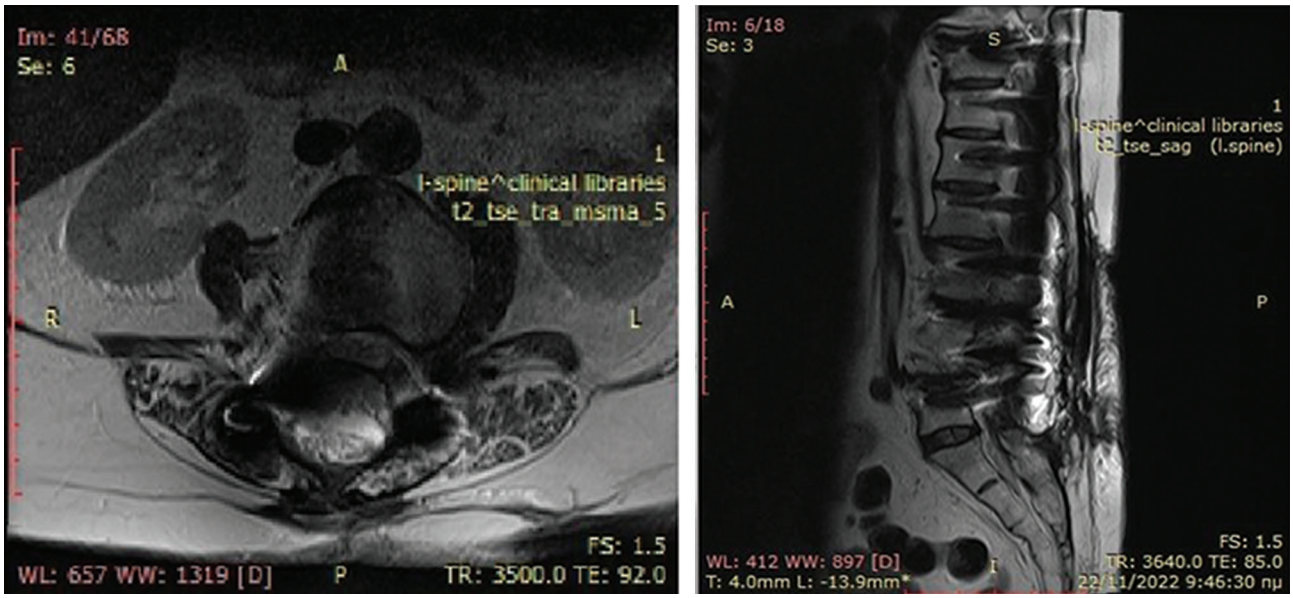

Figure 3. Postoperative MRI scan. T2 sequence sagittal and axial respectively.

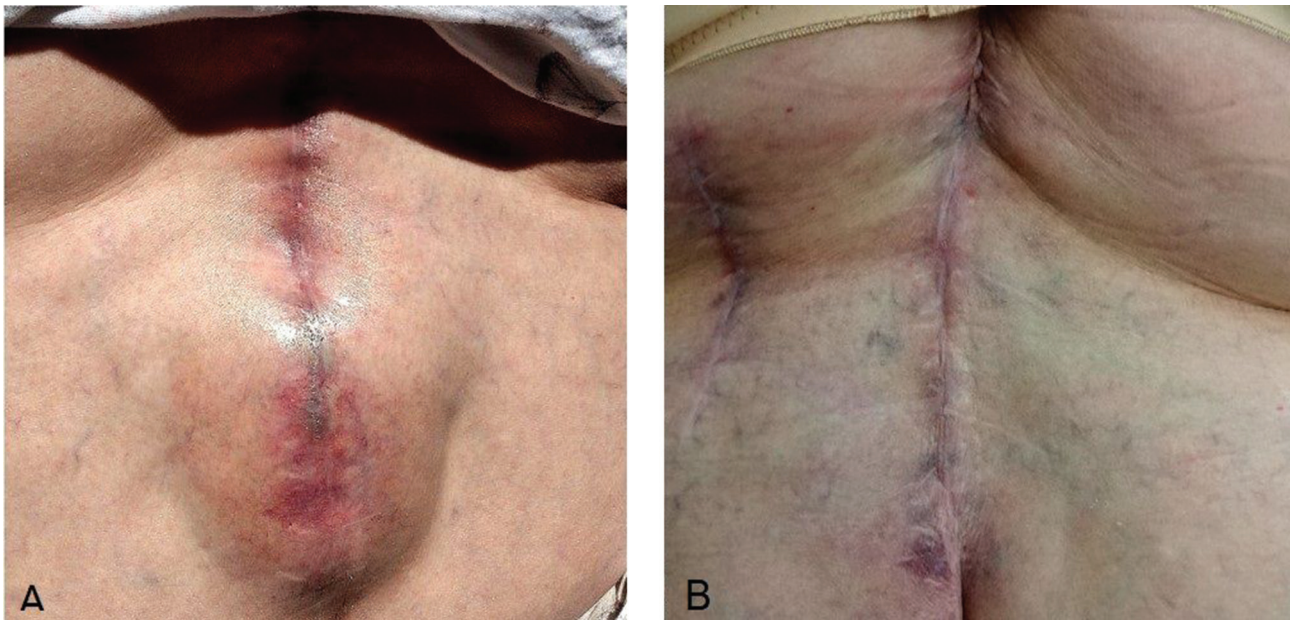

Figure 4. A: Preoperative bulging lumbar pseudomeningocele. **B**: Complete disappearance of the pseudomeningocele.

Up to this day, few studies have described lumbar post-operative pseudomeningoceles.[2-8] Hyndman and Gerber were the first to report post-operative pseudomeningoceles in 1946.[9] Raudenbush et al. described three cases with compressive pseudomeningoceles and neurological defect which were treated with decompression and dural repair.[2] Solomon et al. reported four cases of large asymptomatic pseudomeningoceles that resolved spontaneously, as three of the patients denied surgical treatment and the fourth showed resolution while waiting for surgery.[4] Gupta and Narayan also reported two patients with pseudomeningoceles that were treated with dura repair as the defect was easily seen at revision surgery.[5]

To our knowledge, this is the largest pseudomeningocele of 22.57 cm reported ever in the literature. A previous study of Enke et al. described their case of giant pseudomeningocele and it was measured 8 cm and was the largest lumbar one to date regarding their review of literature.[1,3] Weng et al. also reported a case series of 11 patients treated for their giant pseudomeningoceles and these were measured between 8-11 cm in length.[8] Last but not least, Surapaneni et al. reported their case of giant pseudomeningocele that measured 14×2.8 cm and was surgically treated.[3]

Our patient developed the pseudomeningocele 3 months postoperatively. Several risk factors predispose for pseudomeningocele formation including advanced age, history of

previous surgery in the same area, the lumbar area in opposition to cervical or thoracic, resident involvement and the length of the incision.[10,11] Takahashi et al. retrospectively examined 1014 cases of post-operative pseudomeningoceles and found a slight female predominance, higher incidence in older patients with degenerative spondylolisthesis (9%) or juxtafacet cysts (18.2%).[11] Smorgick et al. also report older age, previous surgery, and degenerative spine disease as risk factors.[10] Our patient had all the aforementioned risk factors: advanced age, female sex, two previous surgeries at the very same site for degenerative spinal disease.

However, this delay in development may be attributed to the local use of anti-adhesive agents in order to prevent postoperative adhesions, as they may interfere with fibroblast migration and normal healing.[4] Additionally, literature demonstrates that when a pseudomeningocele is observed immediate repair is required in order to prevent fistula formation and infection. Our patient proceeded to surgery 9 months after the laminectomy without any signs of infection or fistula formation.

Treatment options remain controversial among surgeons as the site, the size and the neurological defect play key role to the treatment strategy.[12] Surgical options include observation, surgical direct repair, patch techniques (autografts, allografts or fibrin glue), application of dural blood patch or CSF diversion (lumbar shunt or subarachnoid drain).[3,13,14] In our case, we didn't find a clear CSF leak so we decided to fill the cavity with patches from autograft adipose tissue and artificial dura and fibrin glue followed by meticulous closure of surgical layers. It is difficult to discern which technique is the most efficacious as very few data exist in literature and these data refer successful results.[2-8] One thing is for sure that prevention is probably the best approach.[13]

CONCLUSION

Although pseudomeningoceles are rare postoperative complications, a neurosurgeon should maintain a high index of suspicion when an accidental durotomy occurs intraoperatively and re-evaluate the patient postoperatively. Early recognition is significant for such a complication, because it can cause neurological deficit or be a site of central nervous infection and cause further significant comorbidities. Treatment options are still controversial, nevertheless symptomatic patients should be re-operated as soon as possible.

Acknowledgements

The authors have no support to report.

Funding

The authors have no funding to report.

Competing Interests

The authors have declared that no competing interests exist.

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Послеоперационное гигантское поясничное псевдоменингоцеле: описание случая

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Дата получения: 29 апреля 2024 г. ♦ **Дата приемки:** 12 июня 2024 г. ♦ **Дата публикации:** 31 декабря 2024 г.

Образец цитирования: Fermeli D, Panagiotopoulos V, Papadakos D, Theofanopoulos A, Zampakis P, Constantoyannis C. Postoperative gigantic lumbar pseudomeningocele: A case report. Folia Med (Plovdiv) 2024;66(6):911-916. doi: 10.3897/folmed.66.e126479.

Резюме

Послеоперационное псевдоменингоцеле – редкое, но всё ещё существующее осложнение после операций на позвоночнике. Оно может протекать бессимптомно или проявляться болью в спине, корешковой болью или головными болями. Многие псевдоменингоцеле разрешаются спонтанно, другим требуется повторная операция с восстановлением твёрдой мозговой оболочки. Мы представляем пациентку, которая перенесла дуропластику по поводу массивного послеоперационного поясничного псевдоменингоцеле длиной 22.57 см после широкой ламинэктомии. 71-летняя женщина с предыдущей инструментальной операцией на уровне грудопоясничного отдела позвоночника T10-L5 перенесла широкую ламинэктомию L2-5 из-за тяжёлого стеноза канала на уровне L2-5. Во время операции произошла случайная точечная дуротомия на уровне L4-5. Первичное восстановление было невозможным, поэтому была установлена искусственная твёрдая мозговая оболочка. После операции у пациентки наблюдалась утечка спинномозговой жидкости (CSF), которую лечили наружным поясничным дренажем и постельным режимом. Три месяца спустя наша больная обратилась в нашу амбулаторную клинику с большой выпирающей массой длиной 15 см в месте операции без какого-либо неврологического дефицита. Была проведена поясничная КТ, и было обнаружено гигантское поясничное псевдоменингоцеле длиной 22.57 см и шириной 6.29 см от уровня T11 до S2. Мы провели повторную операцию с дуропластикой, и рецидива утечки цереброспинальной жидкости или псевдоменингоцеле после 7 месяцев наблюдения не было.

Псевдоменингоцеле являются редкими послеоперационными осложнениями. Хотя варианты лечения являются спорными, их следует распознавать достаточно рано, чтобы избежать инфекций центральной нервной системы, неврологического дефицита и дальнейших сопутствующих заболеваний.

Ключевые слова

дуропластика, послеоперационное поясничное псевдоменингоцеле, ревизионная операция