

Postoperative Spondylodiscitis. A Review of 24 Consecutive Patients

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Rezumat

Spondilodiscită postoperatorie. Studiul unei serii de 24 de pacienți consecutivi

Introducere: Discita postoperatorie este o complicație rară a intervențiilor chirurgicale pe coloana vertebrală care creează o suferință importantă pacientului și necesită un tratament de lungă durată. Scopul lucrării este de a compara rezultatele tratamentului antibiotic empiric cu cel administrat după izolarea germenului și testarea sensibilității lui la antibiotice în vindecarea acestei complicații.

Material și metodă: În perioada ianuarie 2002 - decembrie 2012, au fost operați 4698 pacienți pentru afecțiuni ale coloanei lombare, hernii de disc, stenoze de canal vertebral. Dintre aceștia, 47 (1%) au fost diagnosticați cu discită postoperatorie. În luna decembrie 2012 au fost înregistrate 24 cazuri de spondilodiscită după hernii de disc lombare operate prin fenestrație și foraminotomie. Un Grup A de 13 bolnavi au urmat tratament antibiotic empiric antistafilococic. Grupul B format din 11 bolnavi au urmat tratament antibiotic după izolarea germenului prin biopsie deschisă și testarea sensibilității la antibiotice (n=8), sau izolarea germenului din secreția plăgii operatorii (n=3).

Rezultate: După 4 până la 6 luni de tratament antibiotic asociat cu imobilizare în corset Boston simptomatologia s-a ameliorat progresiv în paralel cu normalizarea constantelor biologice, VSH, PCR. Din grupul A, 5 pacienți nu au răspuns

la tratamentul antibiotic administrat și au necesitat debridare ulterioară și izolarea germenului.

Concluzii: Spondilodiscita este o complicație a intervențiilor chirurgicale pe coloana vertebrală care se tratează cu antibiotice administrate o perioadă îndelungată de 4-6 luni. Izolarea germenului prin puncție biopsică sau biopsie deschisă permite un tratament antibiotic adecvat și o vindecare mai rapidă.

Cuvinte cheie: infecția spațiului intervertebral, discita, discectomie

Abstract

Background: Postoperative discitis is a rare complication of spine surgery that creates a significant patient suffering and requires long-term treatment. The aim of this study was to compare the empirical antibiotic treatment with the treatment according to antibiotics susceptibility of isolates in curing this complication.

Material and method: In the period January 2002 - December 2012, 4698 patients were operated for lumbar spine disorders: lumbar disc herniation, spinal canal stenosis. Of these patients, 47 (1%) were diagnosed with postoperative discitis. In December 2012 there were 24 cases of spondylodiscitis after lumbar disc herniation operated by inter-laminar approach and foraminotomy. The A group of 13 patients received anti-staphylococcal empirical antibiotic treatment. The B group consisting of 11 patients received antibiotic therapy after germ isolation by open biopsy from discal intervertebral space (n=8) and from surgical wound secretion (n=3) and antibiotic susceptibility testing.

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Results: After 4 to 6 months of antibiotic treatment associated with immobilization in Boston corset the symptoms gradually improved in parallel with normalization of biological constants, ESR, CRP. Five patients of Group A did not respond to the given antibiotic treatment and required further debridement and germ isolation.

Conclusions: Spondylodiscitis is a complication of spine surgery that is treated with antibiotics given for a long time of 4-6 months. Germ isolation by needle biopsy or open biopsy allows proper antibiotic treatment and faster healing.

Key words: disc space infection, discitis, discectomy

Introduction

The first discectomy was performed by Dandy in 1929 and the first description of a discectomy was given by Mixter and Barr.

Today, spinal surgeries are common interventions that are increasing frequency, determining various complications.

A rare complication of disc surgery is disc space infection, firstly reported by Turnbull in 1953 (1).

Described as postoperative discitis or spondylodiscitis, this is an infection of the intervertebral disc and neighboring vertebrae. Modern investigations revealed that disc space and one or both neighboring vertebrae are more or less affected.

The organism located on the patient's skin can produce an iatrogenic spondylodiscitis, if incomplete asepsis is done.

In cases of hematogenous propagation the germ source can be genitourinary and in the intestinal tract. Sometimes the source remains unidentified.

We report a series of 24 consecutive surgeries complicated by spondylodiscitis with various organisms. We review the management of these patients and compare the outcome of empirical vs. targeted (to germs susceptibility) antibiotic therapy.

Patients and Method

In the Department of Neurosurgery of "St. Pantelimon" Emergency Hospital, between January 2002 - December 2011, 4698 patients were operated on for lumbar disc herniation (Table 1).

In this period, 47 patients (1%) were diagnosed with postoperative spondylodiscitis.

In the period of renovation of the operative theatre in 2009, the number of spondylodiscitis slightly increased. A special situation arose in late 2011, when the number of osteodiscitis cases grew explosively. The 24 patients operated in December of 2011 were readmitted in the coming months and diagnosed with postoperative spondylodiscitis.

We reviewed the medical records and management of this particular series of patients complicated with postoperative spondylodiscitis.

Table 1. Frequency of spondylodiscitis

Year	Operations	Spondylodiscitis	
		No.	%
2002	488	0	0
2003	541	1	0.18
2004	388	3	0.77
2005	504	0	0
2006	447	0	0
2007	496	1	0.20
2008	534	3	0.56
2009	479	8	1.6
2010	360	4	1.1
2011	461	3+24	5.9
Total	4698	47	1%

Patient characteristics

There were 14 males and 10 females with an average age of 48 years (range: 33-70).

The level of primary surgery is shown in Table 2.

The primary surgery was performed in the same manner at all patients, described elsewhere (2): prone position skin incision of 4 cm, small unilateral bone window at appropriate

Table 2. Patient characteristics

Patients	No. (%)
Sex	
Male	14 (58.3)
Female	10 (41.7)
Age	
Median	48
Range	33-70
Level of primary surgery	
L3-L4	4 (16.7)
L4-L5	13 (54.2)
L5-S1	7 (29.1)
Signs and symptoms	
Low back pain	20 (83.3)
Buttock pain	1 (4.2)
Hip pain	1 (4.2)
Leg pain	7 (29.2)
Spinal stiffness	8 (33.3)
Increased body temperature	3 (12.5)
Risk factors	
Chronic smoking-related bronchitis	6 (25.0)
Obesity	5 (20.8)
Diabetes mellitus	5 (20.8)
Varicose veins of the lower limbs	4 (16.7)
Deep vein thrombosis	1 (4.2)
Urinary colibacillosis	1 (4.2)
Lithiasic cholecystitis	1 (4.2)
Perianal fistula	1 (4.2)
Chronic hepatitis	2 (8.3)
Hepatic steatosis	3 (12.5)
Chronic alcoholism	4 (16.7)

level, removal of herniated disc and of intradiscal space fragments, followed by epidural drainage and closing of the wound in three layers: aponeurosis, subcutaneous fat, skin. Epidural hemostasis was performed by local application of gelfoam.

After latency period of 2 weeks to 3 months following surgery patients were readmitted.

Symptoms and signs

The most common symptom was low back pain of moderate intensity, worsened with any movement in bed or by bed shaking. Pain was located at the operation level, usually paravertebral with irradiation in buttock and hip in 2 cases.

There were 7 patients with leg pain of increasing intensity.

Other accompanying symptoms were paravertebral muscle spasm, limiting spinal motion.

These patients were initially treated by family physician with NSAIDs and analgesics, then with Dexamethasone (8 mg/day).

Pain and muscle spasm were resistant to bed rest and pain killers. Neurological function was assessed. Twenty patients were neurologically intact. Four patients exhibited motor deficits of the same severity as before surgery.

Only 3 of our 24 patients had fever and chills and 3 developed an incisional wound infection.

Risk factors

There were associated illnesses in the group of patients with spondylodiscitis (Table 2). Five patients were treated by steroid administration before surgery.

Laboratory analyses

The major laboratory analyses were ESR, CPR and WBC. When readmitted, only 1 patient had a normal value of ESR (Table 3).

Normal values for ESR are: ♀ 2-25 mm/h
♂ 2-15 mm/h

The patient with normal ESR at admission presented an increasing ESR value in the next period of time, before decrease after antibiotic therapy.

Normal values for CPR are: 0-5 ng/l. Pathological values are in range (6 - 136) ng/l.

Patient with CPR = 136 had a perianal fistula that was not declared on admission.

The return to the normal range varied between 5 days to 2 month after initiation of antibacterial therapy.

The attempt to isolate the infections agent was performed by blood culture, urine, discal material and surgical wound culture.

From the 4 blood cultures collected during the chills and rising fever period only 1 was positive and highlighted the *Staphylococcus aureus*.

Cultures from incisional wound were performed in 3 cases and they revealed coagulase-positive staphylococcus, one case, coagulase-negative staphylococcus, one case, the other did not revealed any aerobic and anaerobic microbial flora.

Table 3. Laboratory results

ESR Value (mm /h)	No. (%)	CPR Value (ng /l)	No. (%)
normal range	1 (4.2)		
< 20	2 (8.3)	< 10	5 (20.8)
20 - 60	12 (50.0)	10 - 20	3 (12.5)
60 - 100	6 (25.0)	20 - 60	11 (45.8)
> 100	3 (12.5)	> 100	1 (4.2)

Intervertebral disc space material was obtained by "open biopsy" in 8 patients and the following bacteria were identified: *Staphylococcus aureus* (n=3), *Pseudomonas* species (n=1) and *Burkholderia cepacia* (n=2). Disc material cultures remained negative in 2 cases. In these cases, the polymerase chain reaction failed to detect any pathogenic agent. The 2 urine cultures were positive and the identified germ was *Escherichia coli*.

In the remaining cases, the initiation of antibiotic therapy before readmission determined us to abandon any attempt to identify the germ due to the fact that the blood culture and likewise the disc culture can be compromised by prior antibiotic therapy.

Imaging

Magnetic resonance imaging was the method of choice used for detection of the changes in postoperative spondylodiscitis.

It constantly emphasized the disc fluid sign (T2 hyperintensities - weighted MRI) contour irregularities of vertebral end-plates adjacent to the operated disc, changes of edematous type in adjacent vertebral bodies.

Contrast medium uptake was found after contrast administration at the level of the surgical gap in the posterior paravertebral muscles (n=15), anterior epidural (n=10) and in the psoas muscles (n=9) unilateral or bilateral (Fig. 1). In 6 cases the imaging changes expanded in adjacent discs that were intact, either superior or inferior to the operated one.

Lumbar MRI was performed in all cases of spondylodiscitis.

Standard radiography performed in 15 patients on re-hospitalization showed reduction of the operated disk space and discarthrosis changes.

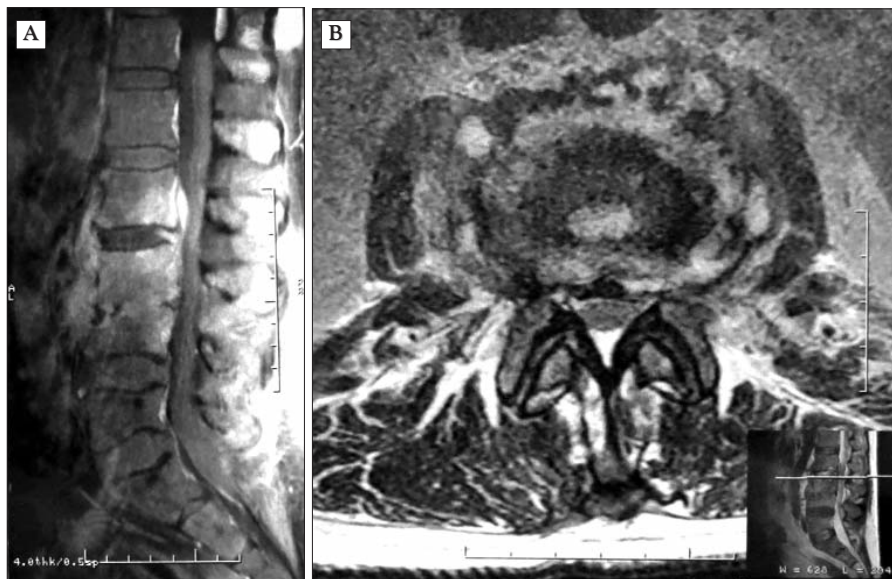
The follow-up of the disease progression and response to treatment was performed by repeated MRI examinations.

Treatment

The first therapeutic measure after diagnosis of spondylodiscitis was the immobilization of the lumbar spine in a rigid Boston-type corset for an average period of 3 months. To reduce pain, patients were treated with standard NSAIDs like Diclofenac, Celebrex associated with relaxants and analgesics.

In the case of the identified germs the antibiotic treatment was made depending on their sensitivity according to the antibiogram.

Figure 1. A 63-year old male operated on for L3-L4 disc herniation who presented perianal fistula. He was readmitted 2 months later with spondylodiscitis. Sagittal (A) and axial (B) magnetic resonance images show contrast enhancement at intervertebral discs L2-L3 and L3-L4 with extension in vertebral bodies L2, L3, L4, anterior and lateral of these vertebral bodies, and in posterior paravertebral muscles



In cases where the germ was not identified due to lack of flora on culture media or non-initiation of the germ isolation because patients had received empirical antibiotic anti-staphylococcal treatment, following treatment plans were used:

- Ciprofloxacin 500 mg x 3 + Biseptol 2 cp x 2;
- Ceftazidin 2 g x 2 + Biseptol 2 cp x 2;
- Rifampicin 600 mg + Tavanic 750 mg;
- Medoxon 2 g x 2 + Tienam 1 g x 2 + Sulperazone 2 g x 2.

The antibiotic treatment was continued for 4 months on average, depending on the CPR and ESR values.

In patients who did not respond to initial antibiotic treatment, the treatment plan was changed and metronidazole was introduced in 4 cases, which is recommended in anaerobic infections, unproven in those cases due to the reasons set forth above.

Follow-up

The follow-up period of patients suffering from postoperative spondylodiscitis was 1 year. Since all the cases presented had emerged in a short period of time, the follow-up had two objectives: monitoring of clinical improvement and normalization of ESR and CPR, on the one hand, and discovery of the germ source, on the other hand.

The clinical picture slowly improved in all patients. Due to the long normalization period, depression occurred besides the initial symptoms - lumbar pain - because of prolonged hospitalization and uncertain possibilities to return to normal functional state, in family and work place.

Psychological support, in addition to presenting the continuously improving biological results, was required in 6 patients. Improvement of the patient with perianal fistula was possible only after surgical cure of the fistula. Five patients required a late debridement with removal of periradicular and disc space inflammatory tissue, while

maintaining external immobilization. After 6 months of treatment all patients were improved. One was retired before surgery. Other 2 were retired by reaching retirement age. Four patients were temporarily retired. The remaining patients resumed their previous jobs.

To achieve the second objective during follow-up, namely the discovery of the germ source, assuming that they appeared due to refurbishments and reorganization of the operating theatre, biological samples were taken from the operating room, but also from the staff working in the operating room: throat swab, nasal swab.

In 2 cases a coagulase-positive staphylococcus was found in the nasal exudates: the remaining samples were negative. The persons were treated by topical application of Turixin ointment.

Discussion

Almost 20 years after the first surgeries for herniated disc performed by Dandy in 1929 and described by Mixter and Barr in 1934, the disc space infection was described among the discectomy complications. After the first discitis cases presented by Turnbull in 1953, there were other series that have attempted to elucidate the incidence, methods of diagnosis and treatment of this complication. Postoperative infection of the disk space was estimated at an incidence of 0.2 to 3.0% of the operations for lumbar intervertebral discs (3,4, 5,6,7).

In recent series, its incidence ranges from 0.2 to 0.4% of discectomies (8,9,10,11,12).

Frequency review of postoperative discitis in 4698 patients in the last 10 years that were diagnosed and treated at "St. Pantelimon" Hospital shows an average incidence of 1%; the figures vary between 0% and 5.9%. A significant increase in postoperative discitis appeared in December 2011: 24 consecutive cases of discectomy were complicated by disk space infection.

Favoring factors have contributed to this increase: diabetes, mellitus urinary colibacillosis, lithiasic cholecystitis, perianal fistula, chronic alcoholism, obesity. They cannot explain the occurrence of consecutive cases of discitis in a short time, when all operated patients were complicated by disk space infection. Neither the detection of coagulase-positive staphylococcus in the nasal secretion of 2 surgeons explains the occurrence of infection in patients operated by various surgeons and teams, where various microbial agents were isolated.

The germ *Burkholderia cepacia* suggests a nosocomial infection. It was not found in the samples taken from the operating room: instruments, medical supplies (gloves, sutures, drapes), on the walls of the operating room, anesthesia equipment, etc.

It is worth noting that after the first cases of discitis, antiseptic measures were intensified and sampling was delayed, which may explain their negativity.

The distribution by sex reflects a prevalence of spondylo-discitis in men, the ratio to women being 1.5:1 as in other published series (13).

The clinical picture and diagnostic measures have no particular issues. Diagnosis was based on biological samples but especially on the imagistic highlighting of changes in the disc space and the adjacent vertebral bodies.

Some therapeutic features are worth mentioning.

Patients with discitis can be divided into two groups: those in which the finding of the pathogenic germ was not attempted due to the initiation of empirical antibiotic therapy before readmission, and those in which we sought and in some cases found the germ responsible for the infection in blood or disc material cultures harvested by open biopsy. Patients in the first group continued to be treated with cephalosporins in combination with Biseptol or metronidazole. Patients in the second group were treated with antibiotics according to pathogen susceptibility.

In both cases the results were good but 5 patients in the first group required a subsequent debridement.

We believe that needle biopsy is preferable in all cases before starting antibiotherapy, it being preferred even to open biopsy. Open biopsy is more invasive but it is more likely to isolate the germ.

For logistical reasons the needle biopsy could not be performed in any patient of our series.

We believe that external immobilization in Boston corset is effective for relieving pain and reducing the movements of the affected motor segment. We have applied it to all patients with good results. It is a more conservative, more easily accepted by patients compared with internal fixation and fusion recommended in recent articles (8).

Conclusions

Prevention of nosocomial infections must be a constant concern of the staff in surgical wards, especially during the economic crisis that impacted the healthcare field. Spondylo-discitis is a complication of discectomy that requires a long period of treatment, with costs exceeding those of the measures to prevent infections.

Isolation of the responsible germs must be the second concern, before starting antibiotic therapy. It has to be done by the least aggressive methods.

Debridement surgery of the infectious outbreak should be reserved for cases that are unresponsive to antibiotic therapy or for those that are complicated by epidural or paravertebral abscesses.

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