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Original Research Article

Outcome of re-exploration and continuous irrigation with gentamicin-mixed normal saline via tri-channel Foley's catheter in postoperative discitis patients at a tertiary care hospital

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ABSTRACT

Background: Discitis, an inflammation of vertebral plates due to infection, can occur post-lumbar discectomy, affecting 0.2–4% of cases. This study assessed outcomes of re-exploration and continuous irrigation with gentamicin-normal saline via a tri-channel Foley catheter for postoperative discitis (POD).
Methods: A retrospective observational study at Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh, analyzed 30 patients with POD post-lumbar disc surgery (March 2020–February 2022).
Results: The mean age was 43.0±12.90 years, with L4/5 being the most affected level (60%). Persistent pain and fever were common (80%), with *Staphylococcus aureus* identified in 73.33% via blood cultures. Treatment showed significant improvements: erythrocyte sedimentation rate (ESR) reduced from 58.32±18.02 mm to 28.00±4.18 mm, CRP from 68.82±19.82 mg/l to 13.42±3.40 mg/l (both $p<0.001$), VAS scores from 7.52±1.73 to 1.32±1.59 ($p<0.01$), and JOA scores across sensory, motor, and activity parameters ($p<0.01$). Satisfactory outcomes were achieved in 80% of patients, with excellent results in 46.67% and good results in 33.33%.
Conclusions: Continuous irrigation with gentamicin-normal saline was effective in reducing inflammation, improving functionality, and achieving favorable outcomes in the majority of patients.

Keywords: Postoperative discitis, Irrigation, Gentamicin, Normal saline, Tri-channel Foley's catheter

INTRODUCTION

Discitis is defined as the inflammation of vertebral plates due to infective causes. Postoperative discitis (POD) can develop following a lumbar discectomy. It comprises superficial and deep infections and was first described as a clinical entity by Turnbull in 1953.[1] It may be localized to disc space or disseminated under the fascia, including discitis, epidural abscess, and spondylitis. The incidence of postoperative discitis (POD) varies from 0.2% to 4%, and the cause is mainly iatrogenic and bacterial, with some descriptions of spontaneous discitis.[2-6] *Staphylococcus* is the most common etiological agent of pyogenic discitis, followed by aerobic Gram-negative bacilli. Other rare

cases were fungal: *Clostridium perfringens*, *Haemophilus species*, and *Aspergillus fumigatus*.[7]

The most typical sign of discitis is pain, which is persistent and worst at night, while up to 15% of patients may not have any pain at all.[8] The patient has an initial post-surgical relief of pain which is followed by a gradual increase of back pain ranging from mild to severe, return of their original pre-operative symptoms. The most common time frame for the development of increasing back pain is 1 to 4 weeks in the postoperative period (ranging from 2 days to 10 weeks).[9] The back pain is often out of proportion to any physical findings and is often accompanied by referred pain radiating into the buttocks, thighs, legs, groin, perineum, or abdomen. Fever is less common, and occurs in about 50% of patients.[10] Only in rare cases patient complaint of constitutional symptoms, such as fatigue or malaise, and even rare is the presentation of sepsis with high fevers, chills, and sweats probably due to the aggressive organism or a florid infection process that frequently warrants an aggressive workup.[9]

Early diagnosis is crucial, usually done by a high index of suspicion. Persisted back pain after 1–8 weeks of surgery (ranging from 2 days to 10 weeks), persistently raised C-reactive protein (CRP), raised ESR, corroborative X-ray/CT features, and signal changes in disc spaces on MRI are pathognomic.[3,11] C-reactive protein and ESR are the most sensitive clinical laboratory makers to assess the presence of infection and the effectiveness of treatment response.[11] MRI is the imaging modality of choice in the diagnosis of spinal infection/discitis.

There are two treatment options for POD: conservative and surgical. Depending on clinical and laboratory criteria, some authors suggested 6–8 weeks of intravenous antibiotics (IVA) followed by 2 months or more of oral medication in patients after open lumbar discectomy (OLD). Other authors suggested 6–8 weeks of intravenous therapy alone.[3,12,13] Gentamicin is a very effective aminoglycoside antibiotic used to treat gram-negative infections. Its mechanism of action is to impair the structural integrity of the bacterial cell membrane by targeting bacterial ribosomes, resulting in the suppression of protein synthesis in the bacterium.[14] Gentamicin irrigation is frequently used following orthopedic surgeries such as total joint arthroplasty and open fracture.[15] Prompt diagnosis, identification of the causal agent, and specific antibiotic treatment are the keys to the successful outcome. Surgical treatment, if required, should be taken as soon as possible to reduce morbidity. Therefore, in this study, we aimed to evaluate the outcome of postoperative discitis through re-exploration and continuous irrigation by gentamicin mixed with normal saline through a tri-channel foley catheter.

METHODS

This was a retrospective observational study conducted in the Department of Neuro Surgery, Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh during the period from March 2020 to February 2022. In this study, we included 30 hospitalized patients with postoperative discitis who underwent lumbar disc surgery at the neuro department of our study institution.

These are the following criteria to be eligible for enrollment as our study participants: patients aged more than 18 years; patients with severe back pain after 2–3 weeks of lumbar disc surgery; patients with continuous irrigation by gentamicin mixed normal saline; and patients who were willing to participate were included in the study; and patients with recent hemorrhage, patients with coagulopathy or receiving anticoagulants, patients with known allergy/hypersensitivity to anesthetic drugs, and patients with any history of acute illness (e.g., renal or pancreatic diseases, ischemic heart disease, asthma, and COPD) were excluded from our study.

Data collection

Informed written consent was taken from the patients. All patients had positive straight leg raising tests, tenderness of the back, and restricted movements on examination. In all cases, the diagnosis was confirmed by magnetic resonance imaging (MRI). Antibiotic treatment was started immediately, and the patient was put on complete bed rest. In this study, the concentrations used were 1 mg/kg of gentamicin in 200 ml of normal saline. All patients were followed by serial blood investigations, including complete blood count, C-reactive protein (CRP), and erythrocyte sedimentation rate (ESR). The conservative treatment was evaluated by clinical and laboratory parameters at 4 weeks. All patients were followed up at 1 and 3 months.

Statistical analysis

All data were recorded systematically in preformed data collection form. Quantitative data was expressed as mean and standard deviation and qualitative data was expressed as frequency distribution and percentage. The data were analyzed by paired t test and functional outcomes were evaluated by visual analog scale (VAS). A p value <0.05 was considered as significant. Statistical analysis was performed by using statistical package for social sciences (SPSS) 22 for Windows version 10.

Figure 1: Postoperative tri channel Foleys catheter drainage.

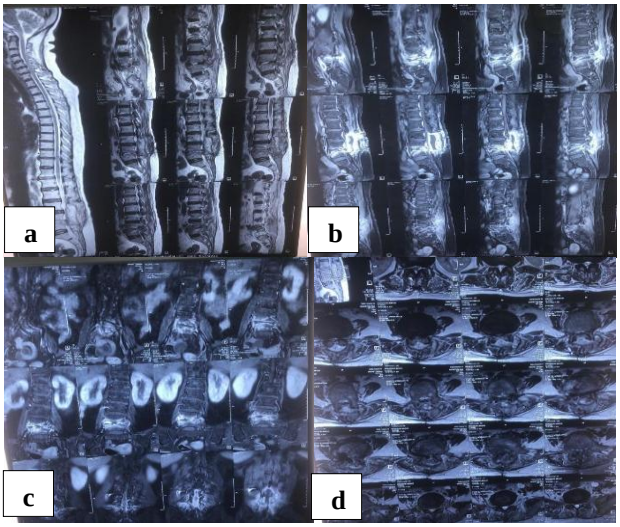

Figure 2 (a-d): MRI images of post-operative discitis.

RESULTS

Figure 3 shows that the majority (40%) of our patients were in the age group of 41-50 years, followed by 20% of them aged 31-40 years, 13.3% of patients were in the both 51-60 and >60 years age group respectively. Only 6.7% of patients were in the age group of ≤20 and 21-30 years old.

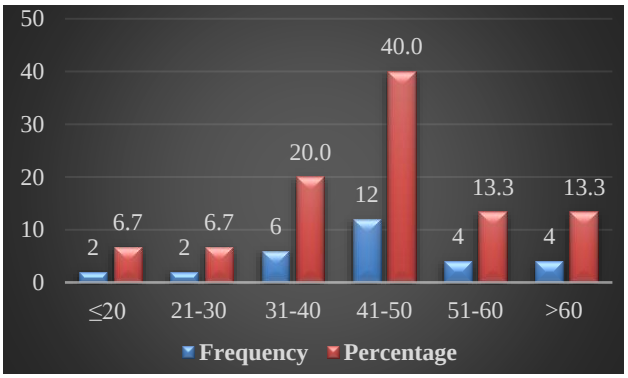

Figure 3: Age distribution of our study patients.

The pie chart in Figure 4 shows that most of our study patients (67%) were male and 33% were female. The male and female ratio was 2:1 in our study.

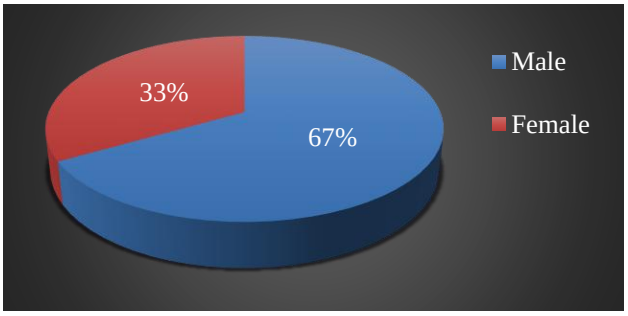

Figure 4: Gender distribution of our study patients.

Table 1 shows the mean age of the patients was 43.0±12.90 years, and the mean BMI was 24.85±5.18 kg/m². The primary surgical levels most commonly involved were L4/5 (60.00%), followed by L5/S1 (26.67%) and L3/4 (13.33%). All patients (100%) experienced persistent pain, with or without neurological deficits. Pain associated with movement was reported by 73.33%, while fever with chills was present in 80.00%. Followed by tenderness over the spine (73.33%), and difficulty in walking (60.00%), and superficial surgical site infection (SSSI) occurred in 20.00%. Blood culture results identified *Staphylococcus aureus* as the most common pathogen (73.33%), followed by *Staphylococcus epidermidis* (13.33%). Regarding co-morbidities, 40.00% of patients had diabetes mellitus, and 26.67% had hypertension.

Table 1: Distribution of our study patients by baseline characteristics.

Baseline characteristics	n=30	P (%)
Mean age (years)	43.0±12.90	
Mean BMI (kg/m²)	24.85±5.18	
Level of primary surgery		
L3/4	4	13.33
L4/5	18	60.00
L5/S1	8	26.67
Clinical presentations		
Persistent pain with/without neurological deficit	30	100.00
Relation of pain with movement	22	73.33
Fever with chills	24	80.00
Tenderness over spine	22	73.33
Difficulty in walking	18	60.00
Superficial surgical site infection (SSSI)	6	20.00
Impairment of sensation of leg	8	26.67
Impairment of bladder and bowel	4	13.33
Blood culture		
Staphylococcus aureus	22	73.33
Staphylococcus epidermidis	4	13.33
Pseudomonas	2	6.7
Enterococcus	2	6.7
Co-morbidities		
Diabetes mellitus	12	40.00
Hypertension	8	26.67

In Table 2, the mean ESR, a marker of inflammation, showed a steady decline from a pretreatment value of 58.32±18.02 mm in the first hour. At 3 weeks post-treatment, it decreased to 53.63±6.57, dropping to 40.68±9.48 at 1 month, and reaching 28.00±4.18 at 3 months. The reduction from pre-treatment to 3 months was statistically significant ($p<0.001$). Similarly, the mean pretreatment CRP levels were 68.82±19.82 mg/l, which reduced to 60.27±8.47 at 3 weeks. At 1 month, CRP levels dropped further to 20.89±8.72; by 3 months, they reached 13.42±3.40. This reduction from pre-treatment to 3 months

was also statistically significant (p<0.001). The length of hospital stay (LOS) was 3.1±1.2 days.

Table 2: Distribution of study patients by laboratory investigations before and after treatment.

Laboratory investigations	Mean±SD
Mean ESR (mm in 1st hour)	
Pretreatment	58.32±18.02
Post-treatment	
At 3 weeks	53.63±6.57
At 1 month	40.68±9.48
At 3 months	28.00±4.18
Pre versus post-treatment at 3 months p value	<0.001
Mean C-reactive protein (mg/l)	
Pretreatment	68.82±19.82
Post-treatment	
At 3 weeks	60.27±8.47
At 1 month	20.89±8.72
At 3 months	13.42±3.40
Pre versus post-treatment at 3 months p value	<0.001
Length of hospital stay (LOS) (days)	3.1±1.2

Table 3: Distribution of study patients by clinical and functional outcomes.

Clinical criteria	Pre-treatment	Post-treatment	P value
*VAS for back pain	7.52±1.73	1.32±1.59	<0.01
JOA score criteria			
Sensory disturbance	0.74±0.37	1.63±0.50	<0.01
Motor disturbance	0.38±0.50	1.68±0.48	<0.01
Restriction of daily activities	7.26±0.81	12.85±1.17	<0.01
Urinary bladder function	0.37±1.12	0.00±0.00	>0.05
Total JOA score	8.01±2.8	16.16±2.15	<0.001
Functional outcome	**n=30**	**P (%)**	
Excellent	14	46.67	
Good	10	33.33	
Fair	6	20.00	
Poor	0	0.00	
Satisfactory	24	80.00	
Unsatisfactory	6	20.00	

Table 3 shows that the visual analog scale (VAS) for back pain showed significant improvement, decreasing from a mean of 7.52±1.73 pre-treatment to 1.32±1.59 post-treatment (p<0.01). Similarly, the Japanese Orthopaedic Association (JOA) score criteria revealed significant progress in several areas. Sensory disturbance scores improved from 0.74±0.37 to 1.63±0.50 (p<0.01), and motor disturbance scores increased from 0.38±0.50 to 1.68±0.48 (p<0.01). Daily activity restrictions showed marked improvement, with scores rising from 7.26±0.81 to 12.85±1.17 (p<0.01). Excellent outcomes were observed in 14 cases (46.67%), good outcomes in 10 cases (33.33%), and fair outcomes in 6 cases (20.00%). Overall, 80.00% (24 cases) of patients achieved satisfactory results, while 20.00% (6 cases) were classified as unsatisfactory.

Table 4 shows the complications and associated risk factors observed in the study. Among the complications, unipolar diathermy burns were the most frequent, reported in 46.67% of cases, followed by curettage of the end plate (26.67%) while the use of local antibiotics and local steroids each accounted for 13.33%. Regarding risk factors, comorbidities were the most prevalent (40%), followed by blood loss (26.67%), immunosuppressive drugs (20%), and smoking and longer duration of surgery were each reported in 13.33% of cases.

Table 4: Distribution of study patients by complications and risk factors.

Complications	N	P (%)
Unipolar diathermy burn	14	46.67
Curettage of the end plate	8	26.67
Use of local antibiotics	4	13.33
Use of local steroid	4	13.33
Risk factors		
Comorbidities	12	40.0
Blood loss >1500 ml	8	26.67
Longer duration of surgery	4	13.33
Immunosuppressive drugs	6	20.0
Smoking	4	13.33

DISCUSSION

In this study, we took 30 patients with postoperative discitis and they received continuous irrigation by gentamicin mixed with normal saline. Abdul Wahid et al found the incidence of discitis was 3% in all patients (320 patients), 6% in the first group without intradiscal gentamicin injection, and 0.5% in the second group using intradiscal gentamicin injection.[16]

The interval from the operation to the onset of signs and symptoms is usually 3 days to 8 months.[17] In the current study, 18 patients developed discitis (3-6) weeks postoperatively, and 12 patients developed postoperative discitis one week after surgery. Wahid et al found 8 patients developed discitis (3-6) weeks postoperatively and one patient developed postoperative discitis one week after surgery.[16]

In the current study, all patients (100%) experienced persistent pain, and 73.33% reported pain associated with movement, while 80.00% reported fever with chills. Patients with POD complained of severe backache which

is exacerbated by movements, paravertebral muscle spasms, and severe limitation of spine movements and sometimes occupied by anxiety and depression.[18,19]

Although a variety of species have been associated with POD, the illness is still predominantly caused by bacteria. In several investigations, *Staphylococcus* continues to be the most common primary pathogen.[20,21] In the present study, blood culture results identified *Staphylococcus aureus* as the most common pathogen (73.33%), followed by *Staphylococcus epidermidis* (13.33%). Singh et al found that *Staphylococcus* is the only identified pathogen in their study.[7]

Discitis is strongly indicated by an elevated ESR that never goes down after surgery.[22] Singh et al found that all 31 patients had increased CRP, 93% had increased white blood cell count, and 97% showed increased ESR that supported the previous studies.[7] Wahid et al found that in all 9 patients with postoperative discitis had high ESR, positive C-reactive protein was more than 6.6 mm/dl.[16]

Since all our study patients received gentamicin mixed with normal saline, we had a lower surgical site infection (20%). Emile et al discovered that the SSI rates were considerably lower in the gentamicin saline group (4.3%) compared to the no-irrigation group (17.4%).[23] Fatula et al found that the SSI rate in the no-irrigation group was slightly higher than in the gentamicin group (16.54% and 15.21%) respectively.[24] In contrast, Bayer et al found that the incidence of infectious adverse events was higher in patients who received gentamicin lavage than in patients who did not (2% compared to 0%); however, the results were not statistically significant (p=0.48).[25]

The length of hospital stay (LOS) is a challenging outcome to measure due to the presence of risk factors in the studies. In this study the mean LOS was 3.1±1.2 days. Emile et al reported the average LOS for the three study groups – no irrigation 1.14±0.3), gentamicin–saline irrigation 1.1 ±0.26), and NS irrigation 1.05±0.24), with a p value of 0.18.[23] The average LOS in the study by Fatula et al was three days for the group that received no irrigation, four days for the group that received gentamicin saline irrigation, and four days for the group that received irrigation with a combination of gentamicin and clindamycin ($p<0.001$).[24] Bayer et al found that the group that received gentamicin irrigation had a longer LOS than the group with no irrigation (2.6±1.4 and 1.9±0.8, $p<0.01$) respectively.[25] Maaty et al reported a shorter average LOS in the gentamicin group (1.3±0.5) than in the saline group (1.4±0.7); however, the difference was insignificant (p=0.302).[26] According to Yazdi et al, the NS group's LOS varied between 8 and 14 days, but the gentamicin–saline group's LOS ranged between 13 and 30 days.[27] Regarding risk factors, comorbidities were the most prevalent (40%), followed by blood loss (26.67%), immunosuppressive drugs (20%), and smoking and longer duration of surgery were each reported in 13.33% of cases. Koutsoumbelis et al's study found four procedure-related risk factors: greater surgical time; intraoperative blood loss/need for transfusion; inadvertent durotomy; and more than ten personnel in the operating room (OT).[28] Previous studies have also identified increased operative time, multilevel surgery, revision surgery, and an increased number of people in the OT as important predisposing factors for postoperative spinal infections.[29]

Limitations

Our study was a single-center study. We took a small sample size due to our short study period. After evaluating those patients, we did not follow up with them for the long term and did not know other possible interference that may happen in the long term with these patients.

CONCLUSION

This study found that the management of postoperative discitis using re-exploration and continuous irrigation with gentamicin-mixed normal saline through a tri-channel Foley catheter demonstrated promising outcomes in this study. The method significantly reduced inflammation, as shown by significant decreases in ESR and CRP levels, and improved clinical symptoms such as pain and functional outcomes. Most patients achieved satisfactory functional outcomes, with a substantial proportion reporting excellent or good results. This technique offers a viable treatment option for postoperative discitis, particularly in cases unresponsive to conservative management.

So further study with a prospective and longitudinal study design including a larger sample size needs to be done to validate the findings of our study.

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REFERENCES

1. Turnbull F. Postoperative inflammatory disease of lumbar discs. J Neurosurg. 1953;10:469-73.
2. Onik G. Automated percutaneous biopsy in the diagnosis and treatment of infectious discitis. Neurosurg Clin N Am. 1996;7(1):145-50.
3. Moon MS, Kim SS, Lee BJ, Moon JL, Sihn JC, Moon SI. Pyogenic discitis following discectomy. J Orthop Surg. 2012;20(1):11-7.
4. Chen SH, Chen WJ, Wu MH, Liao JC, Fu CJ. Postoperative infection in patients undergoing posterior lumbosacral spinal surgery: a pictorial guide for diagnosis and early treatment. Clin Spine Surg. 2018;31(6):225-38.
5. Osti O, Fraser R, Vernon-Roberts B. Discitis after discography. The role of prophylactic antibiotics. J Bone Joint Surg Br. 1990;72:271.

6. Jain M, Sahu RN, Gantaguru A, Das SS, Tripathy SK, Pattnaik A. Postoperative lumbar pyogenic spondylodiscitis: an institutional review. J Neurosci Rural Pract. 2019;10(3):511-8.
7. Singh DK, Singh N, Das PK, Malviya D. Management of postoperative discitis: A review of 31 patients. Asian J Neurosurg. 2018;13:703-6.
8. Torda AJ, Gottlieb T, Bradbury R. Pyogenic vertebral osteomyelitis: analysis of 20 cases and review. Clin Infect Dis. 1995;20:320-8.
9. Rawlings CE, Wilkins RH, Gallis HA, Goldner JL, Francis R. Post-operative intervertebral disc space infection. Neurosurgery. 1983;13:371-5.
10. Mylona E, Samarkos M, Kakalou E, Fanourgiakis P, Skoutelis A. Pyogenic vertebral osteomyelitis: a systemic review of clinical characteristics. Semin Arthritis Rheum. 2009;39:10-7.
11. Santhanam R, Lakshmi K. A retrospective analysis of the management of postoperative discitis: a single institutional experience. Asian Spine J. 2015;9(4):559-64.
12. Silber JS, Anderson DG, Vaccaro AR, Anderson PA, McCormick P; NASS. Management of postprocedural discitis. Spine J. 2002;2(4):279-87.
13. Hadjipavlou AG, Korovessis PG, Nakavelakis KN. Spine infections: medical versus surgical treatment options. In: Vaccaro AR, Eck JC, editors. Controversies in spine surgery: best evidence recommendations. 1st edition. New York/Stuttgart: Thieme Publishers. 2010;250-60.
14. Wang J, Yang Y, Lv W, Xu S, Mei S, Shi F, et al. Gentamycin irrigation significantly reduces 28-day surgical site infection after emergency neurosurgery. Br J Neurosurg. 2024;38(2):481-5.
15. Bansal D, Khatri K, Dahuja A, Lakhani A, Malhotra N. Comparison between vancomycin and gentamicin for intraoperative presoaking of hamstring graft in primary anterior cruciate ligament reconstruction. Cureus. 2022;14(2):e22550.
16. AbdulWahid AT. Gentamycin injection in disc space during lumbar discectomy (aiming to prevent post-operative discitis). J Fac Med Baghdad. 2015;57(1):15-7.
17. Rath SA, Nelf U, Schneider O, Richter HP. Neurosurgical management of thoracic and lumbar osteomyelitis and discitis in adults: a review of 43 conservative surgically treated patients. Neurosurgery. 1996;38:926-33.
18. Rohde V, Meyer, Schaller, Hassier WE. Spondylodiscitis after lumbar discectomy: incidence and a proposed prophylaxis. Spine. 1998;23:615-20.
19. Fouquet B, Ganpille P, Jattit F, Cotty P, Lapierre F, Valat JP, et al. Discitis after lumbar disc surgery: features of septic and aseptic forms. Spine. 1992;17:356-8.
20. Sapkas GS, Mavrogenis AF, Mastrokalos DS, Papadopoulos E, Papagelopoulos EC, Papagelopoulos PJ. Postoperative spine infection: a retrospective analysis of 21 patients. Eur J Orthop Surg Traumatol. 2006;16:322-6.
21. Hopkinson N, Stevenson J, Benjamin S. A case ascertainment study of septic discitis: clinical, microbiological and radiological features. QJM. 2001;94:465-70.
22. Thelander U, Larsson S. Quantization of C-reactive protein level and erythrocyte sedimentation rate after spinal surgery. Spine. 1992;17:400-4.
23. Emile SH, Elfallal AH, Abdel-Razik MA, El-Said M, Elshobaky A. A randomized controlled trial on irrigation of open appendectomy wound with gentamicin-saline solution versus saline solution for prevention of surgical site infection. Int J Surg. 2020;81:140-6.
24. Fatula LK, Nelson A, Abbad H, Ewing JA, Hancock BH, Cobb WS, et al. Antibiotic irrigation of the surgical site decreases incidence of surgical site infection after open ventral hernia repair. Am Surg. 2018;84(7):1146-51.
25. Bayer J, Vackova Z, Svecova H, Stirand P, Spicak J, Martinek J. Gentamicin submucosal lavage during peroral endoscopic myotomy (POEM): a retrospective analysis. Surg Endosc. 2018;32(1):300-6.
26. Maaty AM, Yehia AA, Abdelaleem MM, El-Fattah MA. Subcutaneous antibiotic irrigation to prevent wound infection in obese patients undergoing cesarean section. Women Health Care Issues. 2021;4(3):1-5.
27. Yazdi H, Gomrokchi AY, Nazarian A, Lechtig A, Hanna P, Ghorbanhoseini M. The effect of gentamycin in the irrigating solution to prevent joint infection after anterior cruciate ligament (ACL) reconstruction. Arch Bone Jt Surg. 2019;7(1):67-74.
28. Koutsoumbelis S, Hughes AP, Girardi FP, Cammisa FP Jr, Finerty EA, Nguyen JT, et al. Risk factors for postoperative infection following posterior lumbar instrumented arthrodesis. J Bone Joint Surg Am. 2011;93:1627-33.
29. Chahoud J, Kanafani Z, Kanj SS. Surgical site infections following spine surgery: eliminating the controversies in the diagnosis. Front Med (Lausanne). 2014;1:7.

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