Int J Clin Exp Med 2020;13(7):5100-5107
www.ijcem.com /ISSN:1940-5901/IJCEM0111399

Original Article

Efficacy of radical incision and drainage for perianal abscesses and related serum activin A levels

Hengqing Gao[1], Runping Liu[1], Zhengchun Yang[3], Xiaoqiang Wang[1], Wei Wang[1], Furao Gong[1], Jing Hu[2]

Departments of [1]Anorectal, [2]Science and Education, Zigong Hospital of Traditional Chinese Medicine, Zigong, Sichuan Province, China; [3]Sichuan Administration of Traditional Chinese Medicine, Chengdu, Sichuan Province, China

Received March 25, 2020; Accepted April 24, 2020; Epub July 15, 2020; Published July 30, 2020

Abstract: Objective: To explore the efficacy of radical incision and drainage for patients with perianal abscess and its effect on serum activin A (ACTA) levels. Methods: A total of 128 patients with perianal abscesses were randomly divided into group A (radical incision and drainage, n = 64) and group B (simple incision and drainage, n = 64). Results: Visual analogue scale (VAS) score, gas, postoperative persistent infection and wound healing time in group A were significantly lower than those in group B (all P<0.001). Compared with group B, group A had significantly higher effective treatment rates, but lower serum ACTA levels 3 days after operation and lower recurrence rate of perianal abscess and anal fistula (P<0.001). Conclusion: The application of radical incision and drainage in patients with perianal abscesses can effectively reduce postoperative pain, and also has the advantages of faster postoperative recovery, lower incidence of adverse events and reduced inflammatory response. Radical incision and drainage and serum ACTA levels 3 days after operation are key factors for the recurrence of perianal abscess and anal fistula in patients with perianal abscesses.

Keywords: Perianal abscess, radical incision and drainage, activin A, risk factors, clinical efficacy

Introduction

Perianal abscess, is a common benign human disease, and it is thought to develop from infection of the anal glands in 90% patients, which can lead to the accumulation of pus in the perianal tissues. The pus can spread to one or both sides of the ischiorectal fossa, causing great discomfort to patients [1-3]. Perianal abscess is characterized by rapid formation and fast progression, and its symptoms include fever and defecation pain, which can seriously affect patients' quality of life [4, 5]. Although perianal abscess is a benign disease, a delay in treatment may cause a serious worsening of the condition and a series of complications, eventually leading to poisoning, shock, and even death [6].

Surgical incision drainage is a common treatment for perianal abscess. After incision, the abscess is drained, which makes the abscess cavity and surrounding edema subside, thus achieving the therapeutic effect [7]. However, the long-term efficacy of simple incision and drainage is limited, as this procedure can only be used to drain the abscess under the superficial skin, and it has a high incidence of postoperative recurrence as well as a high risk of anal fistula, and often results in a second surgery for most patients [8]. Radical incision and drainage involve the simultaneous treatment of the abscess and anal gland, which can help avoid a second operation, reduce the incidence of postoperative recurrence and promote the recovery of patients [9]. Previous study has shown that the prognosis of wound healing and patients' recovery can be negatively affected by adverse factors after the body suffers injuries, and thus affects the healing outcome [10]. Activin A (ACTA) is a key regulator involved in many biological processes, such as development, homeostasis, inflammation and tissue remodeling, and its level is closely related to the inflammatory response [11].

Treatment for perianal abscess using incision and drainage has been researched extensively

[12, 13]. However, there are few studies on the changes in ACTA levels and the risk factors for recurrence after incision and drainage. This study compared the efficacy of radical incision and drainage and simple incision and drainage for patients with perianal abscesses, and analyzed the changes in ACTA levels as well as the risk factors for recurrence after operation.

Materials and methods

Patients

A total of 128 patients with perianal abscesses treated in Zigong Hospital of Traditional Chinese Medicine from March 2016 to March 2018 were studied. Patients were randomly divided into group A and group B (64 cases in each group). There were 37 males and 27 females in group A, ranging in age from 21 to 83 years old, with an average age of 50.3±6.8 years. Their course of disease was 1-6 weeks with an average of 2.4±0.6 weeks. In group B, there were 35 males and 29 females, ranging in age from 22 to 84 years old, with an average age of 49.7±5.6 years. Their course of the disease was 1-5 weeks with an average of 2.3± 0.4 weeks. This study was approved by the Ethics Committee of Zigong Hospital of Traditional Chinese Medicine and all patients signed the informed consent.

Inclusion criteria

Patients met the diagnostic criteria of perianal abscess; patients were between 20 and 85 years old; patients had complete clinical data; and patients received incision and drainage for the first time.

Exclusion criteria

Patients were uncooperative during surgery; patients had contraindications for surgery; patients had other anorectal diseases, severe organ dysfunction, connective tissue diseases, hematopoietic disorders, endocrine and metabolic disorders, cardiovascular and cerebrovascular diseases, infectious diseases, malignant tumors, systemic immune diseases; patients with cognitive dysfunction and mental diseases; patients who defecated more than three times per day; and patients on immunosuppressants and/or anti-inflammatory medications within the past month.

Methods

Patients in group B was treated with simple incision and drainage. Specific methods: the patient was placed in a lithotomy position and left/right lateral position to administer epidural anesthesia. A 2 cm radial incision was then made at the anal verge, and the pus was drained. The size of the pus cavity was observed and perianal skin was properly cut to promote the drainage of pus. Vaseline gauze (Henan Piao'an Group Co., Ltd., China) was placed in the abscess cavity to reduce exudation of pus from the wound and fully drain the abscess. Fistulectomy was performed to excise the anal fistula after its formation.

Patients in group A were treated with radical incision and drainage. Anesthesia and body position were the same as those in group B. A radial incision was made in the abscess, and then the incision was continuously enlarged to completely drain the abscess. Probes were used to observe the condition inside of abscess cavity. Rectal mucosa and anal canal skin were cut open along the direction of the probe. One cm long cut above the mucosa internal opening was then cut open, followed by incision of part of the internal sphincter. After complete excision of the internal opening of the abscess cavity, the necrotic tissues were debrided completely. The wound was washed repeatedly with hydrogen peroxide solution (Guangdong Hengjian Pharmaceutical Co., Ltd., China). Finally, iodoform gauze (Xinxiang Huaxi Sanitary Material Co., Ltd., China) was placed in the abscess cavity. Medications used to treat the wound were changed routinely after operation to promote wound healing. No antibiotics were used before and after operation. The patients were followed up for 1 year after operation, and follow-up calls were made every 1 month to monitor recurrence.

Observation indexes

Visual Analogue Scale (VAS) was used to evaluate the pain degree of the two groups 3 days after operation [14]. A 10 cm line for pain scale was drawn. There were two end-points, 0 represented no pain and 10 represented the most severe pain experienced by the patient. Patients were asked to mark a line perpendicular to the VAS line at the point that represented their pain.

Table 1. Baseline information of group A and group B (n (%), $\bar{x}$ ± sd)

Category	Group A (n = 64)	Group B (n = 64)	t/χ^2	P
Sex			0.127	0.722
Male	37 (57.81)	35 (54.69)		
Female	27 (42.19)	29 (45.31)		
Age (year)			0.281	0.596
<38	33 (51.56)	30 (46.88)		
≥38	31 (48.44)	34 (53.12)		
BMI (kg/m^2)	22.76±2.61	22.59±2.54	0.373	0.710
Course of disease (weeks)	2.4±0.6	2.3±0.4	1.109	0.269
Abscess depth (cm)	6.3±1.4	6.2±1.1	0.449	0.654
Abscess location			0.543	0.461
Superficial	39 (60.94)	43 (67.19)		
Deep	25 (39.06)	21 (32.81)		
Smoking history			0.508	0.476
Yes	30 (46.88)	26 (40.62)		
No	34 (53.12)	38 (59.38)		
Drinking history			0.032	0.859
Yes	29 (45.31)	28 (43.75)		
No	35 (54.69)	36 (56.25)		
Hypertension			0.151	0.698
Yes	4 (6.25)	3 (4.69)		
No	60 (93.75)	61 (95.31)		
Diabetes			0.434	0.510
Yes	6 (9.38)	4 (6.25)		
No	58 (90.62)	60 (93.75)		
Place of residence			0.303	0.582
Urban area	39 (60.94)	42 (65.62)		
Rural area	25 (39.06)	22 (34.38)		

Note: BMI, body mass index.

Postoperative anal exsufflation time, duration of infection and incision healing time were also observed. Efficacy of the surgery was assessed two months after operation. Complete wound healing: clinical symptoms such as pain and redness/swelling disappeared and abscess was fully removed. Effective treatment: clinical symptoms such as pain and redness/swelling improved significantly, and the abscess and wound improved to some degree. Ineffective treatment: clinical symptoms such as pain and redness/swelling remained unchanged, and the abscess and wound showed no improvement or were even aggravated. The rate of effective treatment = number of patients with complete wound healing and effective treatment/total number of patients in each group * 100%.

Detection of ACTA levels

Venous blood (3 mL) was drawn from patients before operation, 3 days and 10 days after operation and placed in vacuum blood collection tubes. The blood was centrifugated at 1,000× g for 10 min to separate serum at the upper layer. Serum ACTA level was detected by enzyme linked immunosorbent assay (ELISA) referring to the user manual of human ACTA ELISA kit (Shanghai Guduo Biotechnology Co., Ltd., China). The optical density (OD) of each well is measured sequentially at a wavelength of 450 nm using SHE-3000 Microplate Reader (Beijing Safeheart Medical Systems Co., Ltd., China), and the ACTA level was calculated.

Statistical methods

SPSS 22.0 statistical software (IBM Corp., Armonk, NY, USA) was used to analyze the data. Measurement data was expressed as mean ± standard deviation ($\bar{x}$ ± sd). Independent t-test was used for comparison of measurement data between groups. Paired t-test was used for the comparison of preoperative and postoperative data within a group. Enumeration data were expressed as case/percentage [n (%)]. χ^2 test was used to compare the enumeration data between groups. $P<0.05$ means there is a statistically significant difference.

Results

Baseline information

There was no statistically significant difference in sex, age, body mass index (BMI), course of disease, abscess depth, abscess location, smoking history, drinking history, hypertension,

Table 2. Comparison of post-operative observation indexes, effective rate of treatment and recurrence of perianal abscess and anal fistula between group A and group B ($\bar{x} \pm sd$, n (%))

	Group A (n = 64)	Group B (n = 64)	t or χ^2	P
Post-operative observation indexes				
VAS scores	2.6±0.5	3.1±0.6	t = 5.121	<0.001
Anal exsufflation time (d)	1.8±0.9	3.6±0.7	t = 12.630	<0.001
Duration of infection (d)	3.4±1.1	5.1±1.3	t = 7.986	<0.001
Incision healing time (d)	21.3±1.9	30.9±2.6	t = 23.850	<0.001
Effective rate of treatment			χ^2 = 8.533	0.004
Healing	35 (54.69)	25 (39.06)		
Effective	25 (39.06)	23 (35.94)		
Ineffective	4 (6.25)	16 (25.00)		
Effective rate (%)	93.75	75.00		
Recurrence of perianal abscess and anal fistula				
Perianal abscess	4 (6.25)	16 (25.00)	χ^2 = 8.533	0.004
Anal fistula	3 (4.69)	11 (17.19)	χ^2 = 5.133	0.024

Note: VAS, visual analogue scale.

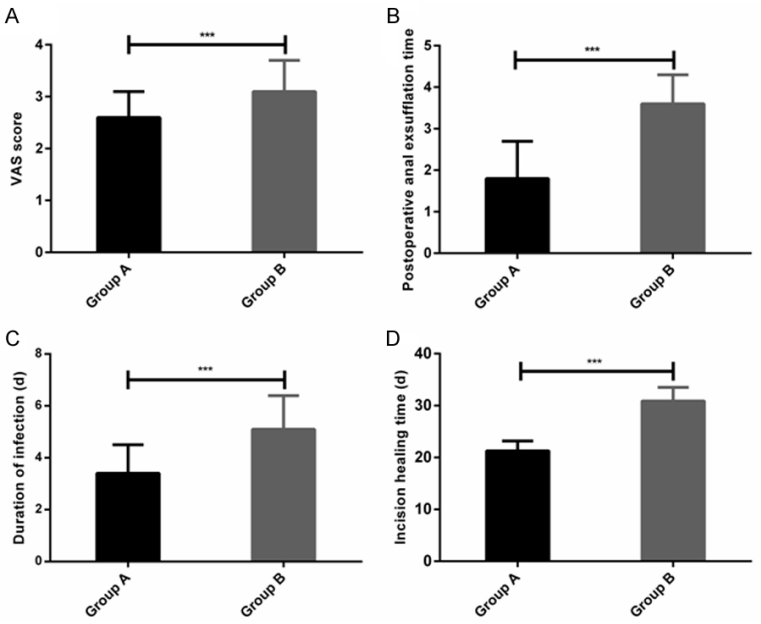

Figure 1. Comparison of post-operative observation indexes of group A and group B. A. Comparison of VAS scores between group A and group B; B. Comparison of anal exsufflation time between group A and group B; C. Comparison of duration of infection between group A and group B; D. Comparison of incision healing time between group A and group B. ***P<0.001. VAS, visual analogue scale.

diabetes and place of residence between group A and group B (**Table 1**, all P>0.05).

Post-operative observation indexes

The VAS scores, postoperative anal exsufflation time, duration of infection and incision healing time for group A were significantly lower than those for group B (all P<0.001). See **Table 2** and **Figure 1**.

Comparison of effective treatment rate

Group A: Thirty-five patients (54.69%) were healed. Twenty-five patients (39.06%) had effective treatment while four patients (6.25%) had ineffective treatment. The effective treatment rate was 93.75%. Group B: Twenty-five patients (39.06%) were healed. Twenty-three patients (35.94%) had effective treatment while 16 patients (25.00%) had ineffective treatment. The effective treatment rate was 75.00%, which was significantly lower than that of group A (**Table 2**).

Comparison of preoperative and postoperative serum ACTA levels

The serum ACTA levels in group A and group B 3 days after operation were significantly higher than those before operation and 10 days after operation (P<0.001). The serum levels of ACTA in group A 3 days after operation were significantly lower than those in group B (P<0.001). There was no statistically significant difference between the serum levels of ACTA in group A

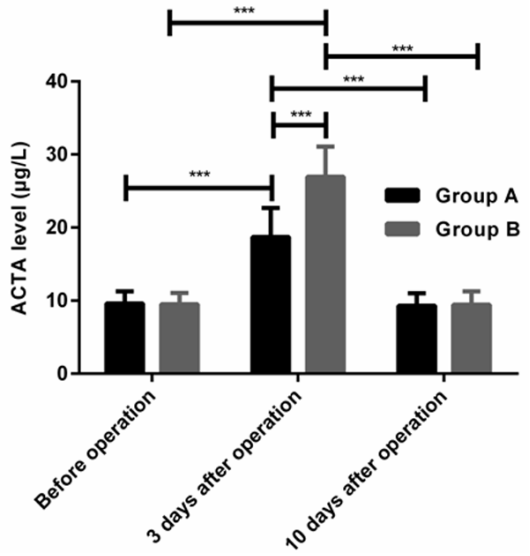

Figure 2. Comparison of preoperative and postoperative serum ACTA levels between group A and group B. ***P<0.001. ACTA, activin A.

and group B before operation and 10 days after operation (P>0.05). See **Figure 2**.

Comparison of recurrence of perianal abscess and anal fistula

The recurrence rate of perianal abscess in group A was significantly lower than that in group B (P<0.01), and the recurrence rate of anal fistula in group A was significantly lower than that in group B (P<0.05). See **Table 2**.

Multivariate analysis of factors affecting recurrence of perianal abscess and concurrence of anal fistula

There were statistically significant differences between the two groups in abscess depth, diabetes, surgical methods and ACTA levels 3 days after operation (all P<0.05). There were no statistically significant differences between the two groups in sex, age, body mass index, course of disease, abscess location, smoking history, drinking history, hypertension and place of residence (all P>0.05). Continuous measurement data were converted to binary variables with its average being the cut-off point and entered into binary logistic regression equation. Multivariate logistic regression analysis of different factors showed that surgical methods (odds ratio (OR): 45.144; 95% confidence interval (95% CI): 12.921-157.729) and serum ACTA levels 3 days after operation (OR: 1.211, 95% CI: 1.028-1.427) affected the recurrence of perianal abscess or anal fistula (P<0.05). Patients undergoing radical incision and drainage and patients with low ACTA levels (<22.47 μg/L) 3 days after operation had a lower risk of perianal abscess or anal fistula recurrence. See **Tables 3** and **4**. Value assignment was analyzed using multivariate logistic regression. Abscess depth was regarded as variant X1 (≥6.2 cm = 1, <6.2 cm = 0). Diabetes was regarded as variant X2 (yes = 1, no = 0). Surgical method was regarded as variant X3 (simple incision and drainage = 1, radical incision and drainage = 0). ACTA (μg/L) was regarded as variant X4 (≥22.47 μg/L = 1, <22.47 μg/L = 0).

Discussion

Radical incision and drainage is a radical operation to drain the pus and remove lesions simultaneously, which can not only cure perianal abscesses, but also prevent secondary anal fistulas to the greatest extent, which greatly shortens the treatment time and reduces the pain and economic burden of patients [15]. Research shows that fistulectomy for primary fistulas during perianal abscess drainage leads to less persistent fistulas and does not increase the risk of fecal incontinence [16]. In our study, our results can serve as proof of the clinical efficacy of radical incision and drainage for perianal abscess, which has the advantages of lower postoperative pain, faster postoperative recovery, and lower incidence of postoperative adverse events. Liu et al. found that radical incision and drainage for high perianal abscess ca reduce pain, shorten healing time, and improve anus function as well as reduce the incidence of postoperative recurrence [17]. The results of this study are consistent with the above findings.

For patients with perianal abscess, the inflammatory response is not only affected by infection factors, but also by the surgical excision, which can be traumatic and cause the release or activation of inflammatory factors by the damaged cells [18, 19]. Activin A, a member of the transforming growth factor beta (TGF-β) superfamily, acts as an important pro-inflammatory factor and plays a key role in the inflammatory response; its level reflects the degree of inflammation and is closely related to the

Table 3. Correlation between clinical parameters and the related indexes and recurrence of perianal abscess or concurrence of anal fistula (n (%), $\bar{x} \pm sd$)

Category	Study group (n = 34)	Control group (n = 94)	t/χ^2	p
Sex			0.125	0.724
Male	20 (58.82)	52 (55.32)		
Female	14 (41.18)	42 (44.68)		
Age (year)			2.235	0.135
<38	13 (38.24)	50 (53.19)		
≥38	21 (61.76)	44 (46.81)		
BMI (kg/m^2)	22.73±2.58	22.61±2.49	0.239	0.812
Couse of disease (weeks)	2.6±0.6	2.4±0.5	1.893	0.061
Abscess depth (cm)	6.6±1.5	6.0±1.3	2.212	0.029
Abscess location				
Superficial	20 (58.82)	62 (65.96)		
Deep	14 (41.18)	32 (34.04)		
Smoking history			2.769	0.096
Yes	19 (55.88)	37 (39.36)		
No	15 (44.12)	57 (60.64)		
Drinking history			1.326	0.250
Yes	18 (52.94)	39 (41.49)		
No	16 (47.06)	55 (58.51)		
Hypertension			2.085	0.149
Yes	4 (11.76)	3 (3.19)		
No	30 (88.24)	91 (96.81)		
Diabetes			10.490	0.001
Yes	7 (20.59)	3 (3.19)		
No	27 (79.41)	91 (96.81)		
Place of residence			0.380	0.538
Urban area	23 (67.65)	58 (61.70)		
Rural area	11 (32.35)	36 (38.30)		
Surgical methods			16.020	<0.001
Simple incision and drainage	27 (79.41)	37 (39.36)		
Radical incision and drainage	7 (20.59)	57 (60.64)		
ACTA levels 3 days after operation (μg/L)	24.05±4.87	20.17±3.58	4.898	<0.001

Note: BMI, body mass index; ACTA, activin A.

Table 4. Multivariate logistic regression analysis of recurrence of perianal abscess and concurrence of anal fistula

Variant	B	SE	Wals	P	OR	95% CI
Abscess depth	0.365	0.189	3.735	0.053	1.440	0.995-2.086
Diabetes	-0.945	0.705	1.797	0.180	0.389	0.098-1.547
Surgical method	3.81	0.638	35.628	<0.001	45.144	12.921-157.729
ACTA levels 3 day after operation (μg/L)	0.192	0.084	5.233	0.022	1.211	1.028-1.427

Note: B, unstandardized beta; SE, standard error; Wals, weighted average least squares; OR, odds ratios; CI, confidence interval; ACTA, activin A.

degree of injury [20]. In this study, our results demonstrated that radical incision and drainage was less traumatic to patients and could reduce inflammation. A study by Hong et al. showed similar results with our study [21]. The reason could be that radical incision and drain-

age caused less damage to patients, reduced inflammatory and stress responses, and thus results in lower ACTA levels.

Further logistic regression analysis of recurrent perianal abscesses and anal fistulas in patients with perianal abscesses showed that the surgical method and serum ACTA levels 3 days after operation were related factors for recurrence of perianal abscess and anal fistula. In a prospective cohort study by Ofstad et al., the levels of IL-6 and ACTA were shown to be independently correlated with cardiovascular events and mortality in patients with type 2 diabetes; where higher the expression of IL-6 and ACTA had a more severe inflammatory response [22]. We speculate that high ACTA levels may indicate more severe inflammatory response in patients with perianal abscess, which increases the recurrence rate of perianal abscesses. Patients treated with radical incision and drainage have fewer recurrences of perianal abscess or anal fistula than those treated with simple incision and drainage, so this procedure can be used as a predictor of recurrence of abscess and anal fistula.

However, there are still some limitations in the study. First, the life quality of perianal abscess patients after operation was not researched. Second, in-depth analysis of related risk factors affecting the efficacy of treatment was not conducted. These limitations need to be further supplemented in future studies, so as to better verify the results of this study.

In conclusion, radical incision and drainage for patients with perianal abscess can effectively reduce postoperative pain, adverse events and inflammatory response, as well as promote faster postoperative recovery. Radical incision and drainage and serum ACTA levels 3 days after operation are the related factors for the recurrence of perianal abscess and anal fistula.

Acknowledgements

This work was supported by the Key Project of Zigong Science and Technology Bureau, Sichuan Province (2016ZC59).

Disclosure of conflict of interest

None.

Address correspondence to: Runping Liu, Department of Anorectal, Zigong Hospital of Traditional Chinese Medicine, No. 59 Machongkou Street, Da'an District, Zigong 643010, Sichuan Province, China. Tel: +86-13990066222; Fax: +86-0813-5101829; E-mail: liurunping6te6@163.com

References

[1] Hasan RM. A study assessing postoperative corrugate rubber drain of perianal abscess. Ann Med Surg 2016; 11: 42-46.
[2] Jin H, Chen Y and Zhang B. Three-cavity clearance (TCC) can decrease the fistula rate after drainage of a perianal abscess: a case-control study. Gastroenterol Rep 2018; 6: 221-224.
[3] Ho YH, Tan M, Chui CH, Leong A, Eu KW and Seow-Choen F. Randomized controlled trial of primary fistulotomy with drainage alone for perianal abscesses. Dis Colon Rectum 1997; 40: 1435-1438.
[4] Sahnan K, Adegbola SO, Tozer PJ, Watfah J and Phillips RK. Perianal abscess. BMJ 2017; 356: j475.
[5] Thomas T, Chandan JS, Harvey PR, Bhala N, Ghosh S, Nirantharakumar K and Trudgill NJ. The risk of inflammatory bowel disease in subjects presenting with perianal abscess: findings from the THIN database. J Crohns Colitis 2019; 13: 600-606.
[6] Seow-En I and Ngu J. Routine operative swab cultures and post-operative antibiotic use for uncomplicated perianal abscesses are unnecessary. ANZ J Surg 2017; 87: 356-359.
[7] Chen W, Zheng R, Baade PD, Zhang S, Zeng H, Bray F, Jemal A, Yu XQ and He J. Cancer statistics in China, 2015. CA Cancer J Clin 2016; 66: 115-132.
[8] Ghahramani L, Minaie MR, Arasteh P, Hosseini SV, Izadpanah A, Bananzadeh AM, Ahmadbeigi M and Hooshanginejad Z. Antibiotic therapy for prevention of fistula in-ano after incision and drainage of simple perianal abscess: a randomized single blind clinical trial. Surgery 2017; 162: 1017-1025.
[9] Zhou HX. Disposable perianal abscess radical surgery on perianal pain and quality of life in patients with perianal abscess. Guide of China Medicine 2014.
[10] Hubner M, Mantziari S, Demartines N, Pralong F, Coti-Bertrand P and Schäfer M. Postoperative albumin drop is a marker for surgical stress and a predictor for clinical outcome: a pilot study. Gastroenterol Res Pract 2016; 2016: 8743187.
[11] Galanis I, Chatzimavroudis G, Christopoulos P and Makris J. Prospective randomized trial of simple drainage vs. drainage and initial fistula

management for perianal abscess. J Gastrointest Dig Syst 2016; 6: 382.
[12] Blume PA, Walters J, Payne W, Ayala J and Lantis J. Comparison of negative pressure wound therapy using vacuum-assisted closure with advanced moist wound therapy in the treatment of diabetic foot ulcers: a multicenter randomized controlled trial. Diabetes Care 2008; 31: 631-636.
[13] Pearce L, Newton K, Smith SR, Barrow P, Smith J, Hancock L, Kirwan CC and Hill J; North West Research Collaborative. Multicentre observational study of outcomes after drainage of acute perianal abscess. Br J Surg 2016; 103: 1063-1068.
[14] Tashjian RZ, Hung M, Keener JD, Bowen RC, McAllister J, Chen W, Ebersole G, Granger EK and Chamberlain AM. Determining the minimal clinically important difference for the American Shoulder and Elbow Surgeons score, Simple Shoulder Test, and visual analog scale (VAS) measuring pain after shoulder arthroplasty. J Shoulder Elbow Surg 2017; 26: 144-148.
[15] Fang C, Zhong H, Lin Y, Chen B, Han M, Ren H, Lu H, Luber JM, Xia M, Li W, Stein S, Xu X, Zhang W, Drmanac R, Wang J, Yang H, Hammarström L, Kostic AD, Kristiansen K and Li J. Assessment of the cPAS-based BGISEQ-500 platform for metagenomic sequencing. Gigascience 2018; 7: 1-8.
[16] Benjelloun EB, Jarrar A, El Rhazi K, Souiki T, Ousadden A and Ait Taleb K. Acute abscess with fistula: long-term results justify drainage and fistulotomy. Updates Surg 2013; 65: 207-211.
[17] Liu YJ, Wang XC, Liu ZS, Zhang J and Sun YJ. Clinical study of low/low pressure drainage radical resection in the treatment of high perianal abscess. Clin Med Chin 2018; 34: 30-33.
[18] Kailiang Z, Xianjun Z and Guangwei S. Effects of saline gauze tamponade of calculus bovis sativus in treatment of local tissues of IL-6 and IL-8 in patients with perianal abscess after surgery. J Clin Surg 2017.
[19] Yan J, Li G, Ma L and Xu H. Comparison of curative effect of incision and drainage with cutting seton as well as incision and drainage on ischiorectal abscess and postanal space abscess. Biomed Res 2017; 28: 9538-9542.
[20] Protic O, Islam MS, Greco S, Giannubilo SR, Lamanna P, Petraglia F, Ciavattini A, Castellucci M, Hinz B and Ciarmela P. Activin A in inflammation, tissue repair, and fibrosis: possible role as inflammatory and fibrotic mediator of uterine fibroid development and growth. Semin Reprod Med 2017; 35: 499-509.
[21] Jin H and Yan Z. Study on the effect of serum and acta on the expression of serum and the expression of serum in patients with perianal abscess. Chinese Journal of Biochemical and Pharmaceuticals 2017.
[22] Ofstad AP, Gullestad L, Orvik E, Aakhus S, Endresen K, Ueland T, Aukrust P, Fagerland MW, Birkeland KI and Johansen OE. Interleukin-6 and activin A are independently associated with cardiovascular events and mortality in type 2 diabetes: the prospective Asker and Baerum Cardiovascular Diabetes (ABCD) cohort study. Cardiovasc Diabetol 2013; 12: 126.