Incidence and Factors Influencing the Development of Fistula-In-Ano after Incision and Drainage of Perianal Abscesses

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Objective: *The aims of the present study were to evaluate the incidence of fistula-in-ano following incision and drainage of acute perianal abscess and to determine factors influencing the fistula formation.*
Material and Method: *Patients with a first-time perianal abscess or intersphincteric abscess who underwent incision and drainage at Siriraj Hospital from January 2005 to June 2008 were reviewed. Patients with coexisting fistula or perianal Crohn's disease were excluded. Incidence and risk factors for fistula formation were analyzed.*
Results: *Sixty-four patients were reviewed (50 males, 14 females). The average age of the patients was 44 years (range 19-82). The average follow-up period was 30 months (range 10-53). Twenty patients (31%) developed fistula-in-ano following incision and drainage. Gender, smoking, alcohol consumption, fever, leukocytosis, and location of abscess were not predictive of fistula formation. Univariate analysis showed that patients aged under 40 years and non-diabetic patients tended to have a higher risk for developing the fistula (43% vs. 21%, OR 2.95, 95% CI 0.98-8.85; p = 0.05 and 38% vs. 13%, OR 4.2, 95% CI 0.85-20.83; p = 0.071, respectively). However, patients receiving perioperative antibiotics (ATB) were less likely to develop subsequent fistula in both univariate and multivariate analysis. The FIA rate in non-ATB group was 48% and only 17% in ATB group (OR 4.5, 95% CI 1.44-14.13; p = 0.01).*
Conclusion: *The incidence of fistula-in-ano following incision and drainage of perianal abscess was 31%. Patients aged under 40 years and non-diabetic patients appeared to have a higher risk for fistula formation. Administration of perioperative antibiotics significantly reduced the rate of subsequent fistula formation.*

Keywords: *Perianal abscess, Anal sepsis, Anal fistula, Risk factors, Incidence, Antibiotics*

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Perianal abscess and fistula-in-ano (FIA) are among the common benign anorectal diseases. The abscess represents acute infection of the soft tissues around the anus, whereas the fistula is related to chronic inflammatory process and presents with fibrotic track with the internal opening in the anal crypt at the dentate line and the external opening in the perianal skin. The most common etiology of perianal abscesses is nonspecific infection of the anal glands, so-called cryptoglandular infection. The standard treatment of perianal abscess is incision and drainage (I&D) because antibiotic therapy alone is seldom effective[1]. However, about 40% of patients with perianal abscess subsequently develop FIA after I&D[2-5].

Knowledge of factors influencing fistula formation is therefore of considerable importance, especially for perioperative management and patient advice. However, there are a limited number of studies determining these risk factors and the results remain controversial. For example, some investigators suggested that positive isolation of gut-derived

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organisms from perianal abscess was associated with an increased risk of FIA[2,6], whereas other investigators found that pus microbiology was not predictive of fistula formation[7].

The aims of the present study were to evaluate the incidence of fistula-in-ano following incision and drainage of acute perianal abscess and to determine factors influencing the fistula formation.

Material and Method

After obtaining approval from Siriraj Institutional Ethics Committee, the authors conducted an analysis of patients who underwent incision and drainage for a first-time, acute perianal abscess (or intersphincteric abscess) between January 2005 and June 2008 at the Department of Surgery, Faculty of Medicine Siriraj Hospital, Bangkok, Thailand. Patients would be excluded from the present study for one of the following reasons: age under 16 years, those with ischioanal abscess or supralevator abscess, those with recurrent anorectal abscess or coexisting anal fistula, those with non-cryptoglandular infection (such as perianal Crohn's disease, trauma, and anal cancer), and those with incomplete initial or follow-up data. Most patients who were ineligible because of incomplete data were those who received emergency operation for the abscess at Siriraj Hospital but received postoperative care elsewhere, based on their universal health coverage policy of Thailand (the so-called 30 baht for all diseases).

Briefly, patients with perianal abscess underwent I&D under either spinal block or general anesthesia in the operation theater, not at the out-patient clinic. Either elliptical or cruciate incision was made over an abscess and the wound was left opened without packing or catheter drainage. Perioperative intravenous antibiotics and pus culture would be utilized at the surgeon's discretion. When consi dering using perioperative antibiotics, the third-generation cephalosporin or gentamicin, plus metronidazole were the most common antibiotic regimen given. Some patients received postoperative oral antibiotics for 5-7 days. Patients were scheduled for follow-up at the outpatient clinic at 4 weeks postoperatively, and then every 2-4 weeks until the wound completely healed or FIA was identified.

FIA was diagnosed if there was a fistulous tract communicating between the anal canal and the incision at perianal skin, with or without discharge from a previous opened wound in the perianal area longer than 8 weeks after I&D. All patients were advised to attend the clinic if they had any suggestive symptoms of FIA, or periodic telephone follow-up was made by an investigator.

Data was collected from outpatient medical charts and operative notes. Recorded data included age, gender, American Society of Anesthesiologists (ASA) classification, smoking habit, alcohol consumption, diabetes mellitus (DM), fever (temperature > 38°C), hematocrit, leukocytosis (WBC > 11,000/mm^3), and location of the abscess. Primary endpoint was fistula formation. All data were prepared and compiled using SPSS computer program (version 10.0 for Windows). The Mann-Whitney U-test and Chi-square test were used to compare data between the two groups. The univariate relation between each independent variable and fistula formation was tested using binary logistic regression. Odds ratio (OR) with 95% confidence intervals (CI) for each variable was determined. The significant variables in the univariate analysis were included in a multivariate model of logistic regression. A p-value of less than 0.05 was considered statistically significant.

Results

Of 118 patients undergoing I&D for a first-time perianal abscess during the period of study, 64 patients (54%) had complete follow-up data. Of those, 50 (78%) were males. The average age of the patients was 44 years (range 19-82). The average follow-up period was 30 months (range 10-53). Twenty patients (31%) developed fistula-in-ano following incision and drainage. All FIA were diagnosed within 6 months postoperatively. Characteristics of patients who developed FIA and those who did not develop FIA are shown in Table 1.

Gender, smoking, alcohol consumption, fever, leukocytosis, and location of abscess were not predictive of fistula formation (Table 2). Univariate analysis showed that patients under 40 years of age and non-DM patients tended to have a higher risk for developing the fistula (43% vs. 21%, OR 2.95, 95% CI 0.98-8.85; p = 0.05 and 38% vs. 13%, OR 4.2, 95% CI 0.85-20.83; p = 0.071, respectively) although they did not reach statistic significance. However, patients receiving perioperative antibiotics (ATB) were less likely to develop subsequent fistula in both univariate and multivariate analysis. The FIA rate in non-ATB group was 48% and only 17% in ATB group (OR 4.5, 95% CI 1.45-14.29; p = 0.007). Details of antibiotics given and incidence of FIA formation are shown in Table 3.

Table 1. Comparison of characteristics between patients who developed fistula-in-ano (FIA) and those who did not. Values were given as mean ± SD, or n (percentage)

	Patients with FIA (n = 20)	Patients without FIA (n = 44)	p-value
Age (year)	39.5 ± 11.3	45.7 ± 13.9	0.09
Male	16 (80%)	34 (77%)	1.00
ASA classification	1.35 ± 0.6	1.66 ± 0.7	0.10
Body temperature (°C)	37.4 ± 0.6	37.4 ± 0.7	0.97
Hematocrit (%)	42.8 ± 3.7	41.0 ± 4.5	0.13
WBC count (cell/mm^3)	12,699 ± 3,610	11,570 ± 4,254	0.31
Diabetes mellitus	2 (10%)	14 (32%)	0.07
Smoker	5 (25%)	14 (32%)	0.58
Alcohol consumer	9 (45%)	12 (27%)	0.16
Location of abscess			0.44
Midline lesion	4 (20%)	5 (11%)	
Lateral lesion	16 (80%)	39 (89%)	
Length of hospital stay (day)	1.65 ± 0.6	1.98 ± 1.2	0.15

SD = standard deviation

Table 2. Univariate analysis of factors influencing fistula formation

Variable	OR (95% CI)	p-value
No perioperative antibiotics	4.54 (1.45-14.29)	0.007*
Non-diabetic mellitus	4.20 (0.85-20.83)	0.07
Age < 40 years	2.95 (0.98-8.85)	0.05
Alcohol consumer	2.18 (0.72-6.57)	0.16
Midline abscess	1.95 (0.46-8.21)	0.44
Male	1.17 (0.32-4.33)	1.00
Fever	1.13 (0.33-3.89)	0.84
Leukocytosis	0.93 (0.32-2.69)	0.89
Smoker	0.71 (0.21-2.36)	0.58

* p-value < 0.05

Table 3. Details of antibiotics (ATB) given and incidence of fistula-in-ano (FIA) formation

	Number of patients	FIA formationn (%)
Non-antibiotics group	29	14 (48%)
Antibiotics group	35	6 (17%)
Preoperative IV ATB only	14	3 (21%)
Pre- and post-operative IV ATB for 1-2 d	8	1 (13%)
Preoperative IV ATB plus postoperative oral ATB for 5-7 d	13	2 (15%)

Discussion

In the present study, incidence of FIA following I&D for acute perianal abscess was 31%, which was slightly less than those previously reported in the literatures[2-5]. The presented lower rate of FIA may be attributed to the fact that other studies did not exclude acute abscess with coexisting fistula or reported a mixed incidence of FIA and recurrent abscesses[2,5]. It

is also possible that the authors underestimated the FIA incidence as some patients with FIA might not seek medical attention because half of the fistulas diagnosed at follow-up were unrecognized by the patients[4].

Based on the present study, both univariate and multivariate analysis showed that patients receiving perioperative antibiotics significantly had a decreased rate of fistula formation. Although administration of antibiotics does not improve healing times nor reduce recurrence after I&D for non-perianal cutaneous abscesses[8,9], the effects of perioperative antibiotic on the outcomes of acute perianal abscess remain controversial especially in terms of subsequent FIA development. Serour and Gorenstein[10] reported an 11% incidence of FIA after needle aspiration and antibiotic injection for perianal abscess in children aged 2-14 years. Meanwhile, infants who received antibiotics following drainage were 2.4 times less likely to develop FIA than those who underwent I&D alone[11]. In the adult population, Mortensen et al[12] prospectively reviewed 107 patients with perianal abscess who underwent I&D and received intra-operative injection of Clindamycin and found only 17.8% fistula formation during 3 months follow-up. However, a retrospective study of 148 patients showed that perioperative antibiotics did not have a significant effect on fistula formation[3].

One possible explanation for the authors' finding of the decreased FIA rate in patients receiving antibiotics is that antibiotics could eliminate residual microorganism which is partly responsible for chronic inflammation, thus resulting in FIA formation. Besides, wound healing could improve when there is a lesser degree of bacterial contamination[13]. A prospective randomized controlled trial determining the effects of perioperative antibiotics on the incidence of FIA development after I&D for perianal abscess is warranted before a definite conclusion on this matter can be drawn.

The presented univariate analysis also showed that either patients aged under 40 years or non-DM patients tended to have a higher incidence of FIA formation, although they did not reach statistical significance. This finding was consistent with a recent cohort study of Hamadani et al[3]. They reviewed 148 patients with acute first-time perianal abscess during 38 months follow-up, and found that age < 40 years and non-DM status significantly increased risk of FIA or recurrent anal sepsis by 2-3 times. There is no clear explanation on why young age and non-DM status were associated with an increase risk of FIA. It is possible that there are different entities of perianal abscess and FIA among various age groups[11]. Perhaps, diabetic patients frequently receive peri-operative antibiotics; thus decreasing the rate of FIA formation in such cases. Moreover, gender, smoking habit and HIV status have been reported not to be predictive of fistula formation[3].

The limitations of the present review are mainly inherent in a retrospective-study basis review and to a relatively small sample size; thus the data obtained is limited in its power. There are a number of cases or potential variables that are not assessable in this retrospective study, such as complex abscess and microbiology of pus culture. It is worth mentioning that, although the positive isolation of gutderived microorganism in the abscess has been claimed to be another risk factor for fistula formation[2,6], the value of routine culture and sensitivity on the therapeutic management of patients with abscesses is quite low[14]. Concerning cost-benefit of this subject, our unit had no policy of routine pus culture so that the association between microorganism and FIA cannot be determined in the present study.

Conclusion

Based on the present study, the incidence of fistula-in-ano following incision and drainage of perianal abscess was 31%. Patients < 40 years and non-diabetic patients appeared to have a higher risk for fistula formation. Administration of perioperative antibiotics significantly reduced the rate of subsequent fistula formation.

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อุบัติการณ์และปัจจัยที่เกี่ยวข้องกับการเกิดฝีคัณฑสูตรหลังการผ่าตัดระบายฝีหนองบริเวณปากทวารหนัก

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วัตถุประสงค์*: เพื่อประเมินอุบัติการณ์และปัจจัยที่เกี่ยวข้องกับการเกิดฝีคัณฑสูตรหลังการผ่าตัดระบายฝีหนองบริเวณปากทวารหนัก*

วัสดุและวิธีการ*: วิเคราะห์เวชระเบียนของโรงพยาบาลศิริราช ระหว่างเดือนมกราคม พ.ศ. 2548 ถึงเดือนมิถุนายน พ.ศ. 2551 สำหรับผู้ป่วยที่มีฝีหนองบริเวณปากทวารหนัก เพื่อประเมินอุบัติการณ์และปัจจัยที่เกี่ยวข้องกับการเกิดฝีคัณฑสูตร*

ผลการศึกษา*: ผู้ป่วยทั้ง 64 ราย (ชาย 50 คน, หญิง 14 คน) อายุเฉลี่ย 44 ปี (ระหว่าง 19 ถึง 82 ปี) ระยะเวลาการตรวจติดตามเฉลี่ย 30 เดือน พบว่าผู้ป่วย 20 ราย หรือคิดเป็นร้อยละ 31 เกิดฝีคัณฑสูตร ปัจจัยเรื่องเพศ, การสูบบุหรี่, การดื่มสุรา, ภาวะไข้, เม็ดเลือดขาวสูงและตำแหน่งของฝีหนอง ไม่สามารถใช้ในการพยากรณ์การเกิดฝีคัณฑสูตรได้การวิเคราะห์ตัวแปรเดี่ยวพบว่าผู้ป่วยที่มีอายุน้อยกว่า 40 ปี และผู้ที่ไม่ได้เป็นเบาหวานจะมีอัตราการเกิดฝีคัณฑสูตรสูงขึ้น 2.95 เท่า (95% CI 0.98-8.85; p = 0.05) และ 4.2 เท่า (95% CI 0.85-20.83; p = 0.071) ตามลำดับสำหรับการวิเคราะห์ตัวแปรรวมพบว่า ผู้ป่วยที่ได้รับการฉีดยาปฏิชีวนะก่อนหรือขณะผ่าตัดมีโอกาสเกิดฝีคัณฑสูตรน้อยลงอย่างมีนัยสำคัญทางสถิติ (OR 4.5, 95% CI 1.44-14.13; p = 0.01)*

สรุป*: จากการศึกษานี้พบว่า อุบัติการณ์การเกิดฝีคัณฑสูตรหลังการผ่าตัดระบายฝีหนองบริเวณปากทวารหนักเกิดขึ้นร้อยละ 31 และการได้รับการฉีดยาปฏิชีวนะก่อนหรือขณะผ่าตัดสามารถลดอุบัติการณ์นี้ได้น้อยลงอย่างมีนัยสำคัญทางสถิติ*