The incidence and risk factors of surgical site infection in micro endoscope-assisted posterior lumbar interbody fusion

Ayako Itoh[1], Ayako Kudo[2], Kazumi Kawakami[2], Keita Nishimura[3], Yuichi Takano[1], Hirohiko Inanami[4]
[1]Iwai Orthopaedic Medical Hospital, Tokyo, Japan, [2]Juntendo University Graduate School of Health Care and Nursing, Chiba, Japan,
[3]Department of Orthpaedic Surgery, Teikyo University School of Medicine, Tokyo, Japan, [4]Inanami Spine and Joint Hospital, Tokyo, Japan,

Disclosures: A. Itoh (N), A. Kudo (N), K. Kawakami (N), K. Nishimura (N), Y. Takano (N), H. Inanami (N)

Introduction:

Consistent with the aging of our society, lumbar interbody fusion surgeries using endoscopes are becoming popular because their minimal invasiveness is suitable for aged patients. Nevertheless, risk factors for surgical site infection (SSI) after such minimally invasive surgeries have been unknown. Based on these backgrounds, we focused on micro endoscope-assisted posterior lumbar interbody fusion (ME-PLIF) surgery. Namely, the aim of the present study was to clarify the SSI rate and the risk factors after ME-PLIF surgery.

Materials and methods:

The study design was a retrospective cohort study with quantitative analysis, which set SSI event as an endpoint. The study was approved by the local ethics committees.

Enrolled in this study were 1,128 cases which underwent ME-PLIF in a hospital from November in 2008 to May in 2015 (M/F: 595/533, age: 64.0±12.5 years). SSI surveillance was performed in each case. And the rate of SSI incidence and the risk factors for SSI were investigated. For statistical analysis, the data were divided into 2 groups with incidence of SSI (SSI (+) and SSI (-) groups). Comparison between the continuous variables was carried out using Mann-Whitney U test or Fisher's exact test. To select the variables that were relevant to SSI incidence, a stepwise regression analysis was performed. Statistical significance was set at $p < 0.05$.

Results:

SSI were observed in 9 cases (0.79%), of which all were categorized in organ/space SSI (Table). Univariate analysis demonstrated the risk factors as follows: age, gender, diabetes complication, ASA-PS classification, preoperative C-reactive protein (CRP) level, percentage of lymphocyte (%lymphocyte) at day 7 after the surgery, and white blood cell (WBC) count, CRP, %lymphocyte and serum albumin level at first visit to the hospital after discharge. Multivariate analysis, subsequently, demonstrated the details: age (OR 6.69; 95％CI 1.37–32.81; p<0.05), diabetes (OR 4.12; 95％CI 1.06–15.93; p<0.05), and CRP at first visit after discharge (OR 2.22; 95％CI 1.54–3.20; p <0.001). In cases aged more than 70 years old by stratification, univariate analysis in 436 cases showed the risk factors were gender, diabetes, smoking history, past surgical history in the same vertebral body, ASA-PS classification, and WBC and CRP levels at first visit after discharge. And multivariate analysis showed diabetes (OR 7.24; 95％CI 1.24–42.33; p<0.05), smoking history (OR 17.63; 95％CI 2.89–107.60; p<0.01), past surgical history in the same vertebral body (OR 9.41; 95％CI, 1.48–60.02; p<0.05), and ASA-PS classification (OR 8.61; 95％CI 1.47–50.37; p<0.05).

Discussion:

SSI rates, 0.7-11.9%, have been reported in previous studies on open lumbar interbody fusion surgeries [1]. The SSI rate obtained from this study was 0.79%, which might be considered to be relatively lower than those in open surgeries. In addition, elder patient, male patient, patient who was complicated with diabetes, and patient with high score in ASA-PS classification were pointed as risky characteristics for SSI in this surgery. And as far as cases aged more than 70 years old, patients who had smoking history or surgical history in the same vertebral body would be added to the above lists. However, all of these characteristics had been already reported as risk factors of SSI in any spine surgeries other than ME-PLIF [2]. Hence it was considered that no particular risky characteristics confined to ME-PLIF would exist.

On the other hand, for the prospective factors to SSI on data in laboratory examinations, their changes at first visit after discharge were indicated to be significant: i.e., increases of WBC and CRP, and decreases of %lymphocyte and serum albumin level. In the hospital which carried out this study, the timing of first visit after discharge usually corresponded with day 28 after the surgery. In previous reports on open spine surgeries, positive findings in laboratory examinations could appear by postoperative 4 days [3]. Thus, in ME-PLIF, timing of changes on laboratory data would be much delayed. This might be caused by peculiarity of this surgery. Namely, even if infection occurs, because of the minimal surgical wound of endoscope technique, the infectious focus may be localized in deep tissues and can hardly expand.

Significance:

At ME-PLIF, points to be noted in the perioperative period were clearly recognized in this study. Especially, laboratory results must continue to be checked, at least, until 1 month after the surgery, even if there are no positive findings just after surgery.

References:

1. Gerometta A,, et al.Int Orthopaedics,(36),457-464,2012.
2. Fang A, et al. Spine,(30),1460-1465,2015.
3. Takahashi J, et al. Spine,(26),1698-1704,2001

Table Comparison of patients' characteristics between SSI (+) and SSI (-) groups.

	SSI (+)	SSI (-)	*p*
n (%)	9 (0.79)	1119 (99.2)	
Age(y), ave ± SD (range)	72.3 ± 8.5(59-85)	63.9 ± 12.5(19-88)	0.037
< 70	2(22.2)	690(61.7)	0.032
≧ 70 years	7(77.8)	429(38.3)	
Gender			
male	9(100)	586(52.4)	0.004
female	0(0)	533(47.6)	
BMI	23.0 ± 2.1(20-27)	23.9 ± 3.6(11-42)	0.441
Diabetes			
yes	4(44.4)	142(12.7)	0.02
no	5(55.6)	977(87.3)	
Smoking			
yes	4(44.4)	235(21.0)	0.101
no	5(55.6)	884(79.0)	
Past surgical history at the same vertebral bodys.			
yes	3(33.3)	130(11.6)	0.079
no	6(66.7)	989(88.4)	
Operative time(min)	140.2 ± 55.2(87-254)	126.8 ± 50.8(48-460)	0.416
ASA-PS			
ASA 1	1(11.1)	282(25.2)	0.012
ASA 2	5(55.6)	783(70.0)	
ASA 3	3(33.3)	54(4.8)	