

## Monitoring for Deep Wound Infection after Thoracolumbar Surgery Significance of Suction Drainage Tip Culture for Early Detection of Postoperative Deep Wound Infection

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### – Abstract –

**Study Design:** A retrospective study.

**Objectives:** To evaluate the usefulness of postoperative suction drainage tip cultures as a method of predicting the development of deep wound infections after thoracolumbar surgery using pedicle screws.

**Summary of Literature Review:** The primary diagnostic elements of post-operative spinal infections are a high degree of clinical suspicion by the surgeon combined with aspiration and culture of the suspected infection sites.

**Materials and Methods:** We analyzed the results of cultures on postoperative suction drainage tips from a total of 471 thoracolumbar surgery cases. We calculated the sensitivity, specificity, and predictive value and investigated the isolated pathogens. In addition, we performed quantitative analyses of serum C-reactive protein using Turbidimetry.

**Results:** The post-operative infection rate was 4.0%. The most common isolated pathogen of the true positive cases was staphylococcus aureus, which was found in 3 cases (methicillin-resistant staphylococcus aureus in 2 cases); and that of the false positive cases was coagulase-negative staphylococcus in 5 cases. The sensitivity of the suction drainage tip culture was 52.6%, the specificity was 96.3%, the positive predictive value was 37.0%, and the negative predictive value was 98.0%. In cases of C-reactive protein, true positive and false negative cases followed the same course, where the CRP decreased slowly for the first week but remained elevated persistently at the 14th postoperative day.

**Conclusions:** Culture of the suction drainage tips could not predict the development of postoperative deep wound infections, but it had more significance in the exclusion of deep wound infections. We concluded that careful observation for other signs of deep wound infections are necessary when a clinically significant pathogens are isolated.

**Key Words:** Thoracolumbar spine, Pedicle screw fixation, Deep wound infection, Suction drainage tip culture, C-reactive protein

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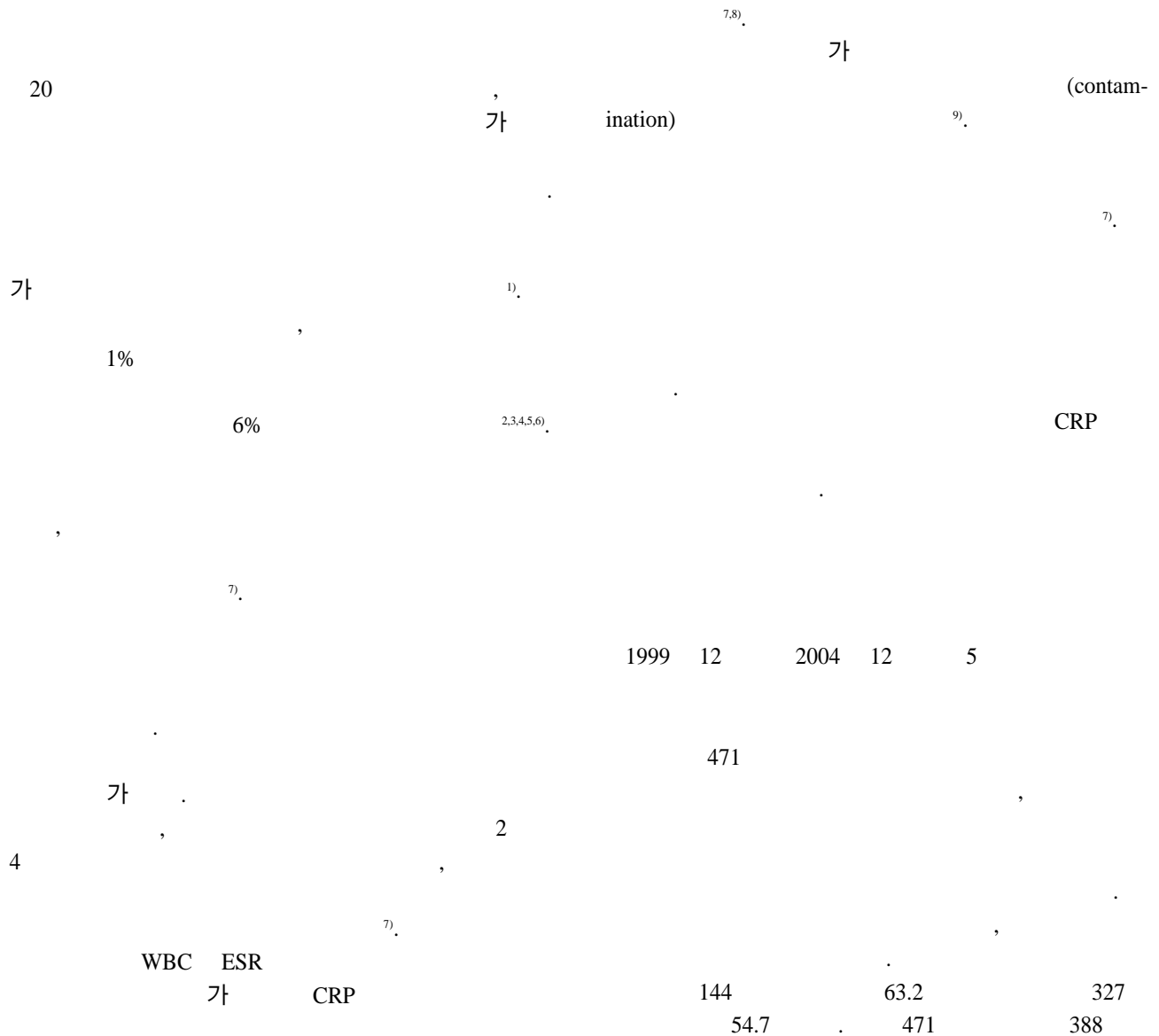
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**Table 1.** Patient characteristics

Deep infection (14cases)			No infection (457cases)	
Disease	Spinal stenosis	6 cases	Spinal stenosis	266 cases
	DLS*	2 cases	Spondylolisthesis	61 cases
	Idiopathic adolscoliosis	2 cases	Idiopathic scoliosis	16 cases
			DLS*	15 cases
			LDK*	15 cases
			Thoracic myelopathy	5 cases
Trauma	Distractive flexion injury	1 case	Distractive flexion injury	37 cases
	Unstable burst fracture	1 case	Unstable burst fracture	26 cases
Revision	FBSS*	2 cases	FBSS*	16 cases
fusion level	4.21		3.11	

\* DLS: degenerative lumbar scoliosis

# LDK: lumbar degenerative kyphosis

\* FBSS: failed back surgery syndrome



2가  
7 Methicillin resistant Staphylococcus aureus가 7 가 coagulase negative staphylococcus Staphylococcus epidermidis가 7 (sensitivity) 52.6%, (specificity) 96.3%, (positive predictive value) 37.0%, (negative predictive value) 98.0% (Table 4).

2) 3. CRP (C-reactive protein)

가 17 Coagulase negative staphylococcus 5 Acinetobacter sp.가 3 (Table 3).

2. , , 3 가 (P=0.45)

27 17 P=0.84) (Fig. 1).  
10

**Table 2.** Organisms from suction drainage tip culture vs wound culture in deep wound infection patients

Suction drainage tip culture		Wound culture	
Organism	No.	Organism	No.
Staphylococcus aureus (MRSA)*	3 (2)	MRSA	7
Staphylococcus epidermidis	3	Enterococcus sp	6
Enterococcus sp	2	Staphylococcus epidermidis (MRSE)*	7 (2)
G(+) rod	1	Pseudomonas sp.	2
Micrococcus	1	Acinetobacter calcoaceticus baumannii complex	2
		Micrococcus	1

\* MRSA: Methicillin resistant staphylococcus aureus

\* MRSE: Methicillin resistant staphylococcus epidermidis

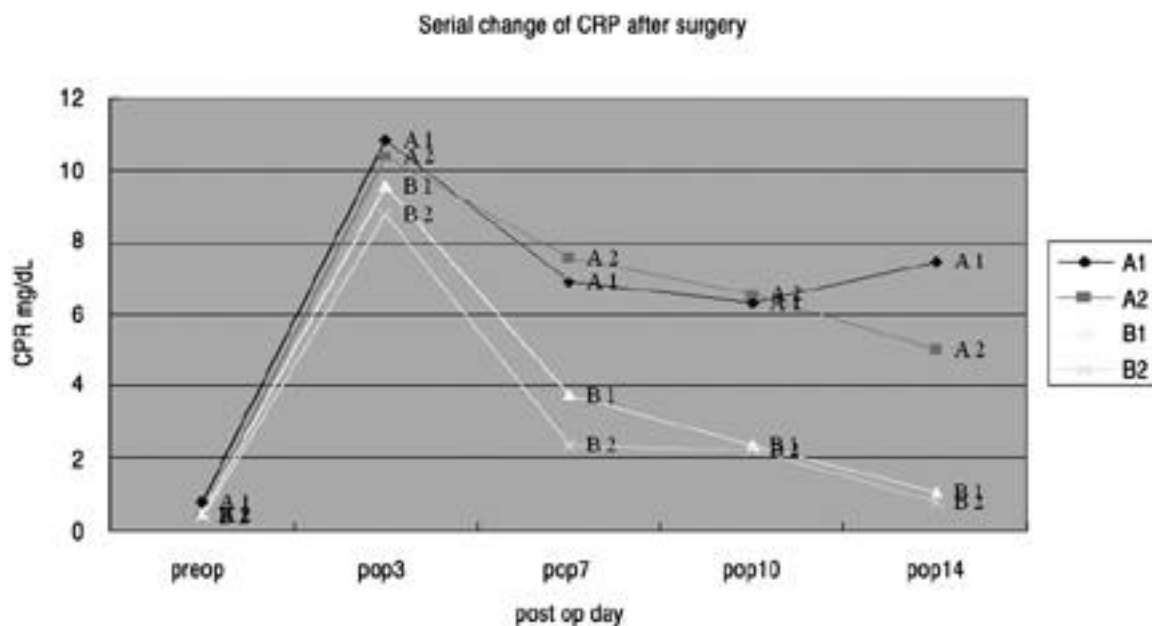
**Table 3.** Organisms from positive suction drainage tip culture in uncomplicated group

Organism	No.
Coagulase negative staphylococcus	5
Acinetobacter sp.	3
Enterococcus sp.	1
Pseudomonas sp.	1
Staphylococcus aureus	1
Staphylococcus viridans	1
G(+) rod	1
G(+) cocci	1
G(-) rod	1

**Table 4.** The sensitivity, the specificity, the predictive value for suction drainage tip culture

		Infection	
		+	-
suction drainage tip culture	+	10	17
	-	4	440
Specificity		96.28%	
Sensitivity		52.63%	
Predictive value	Positive	37.03%	
	Negative	97.99%	

2.36 mg/dL 3 7 CRP 3.74 mg/dL, 17  
 mg/dL 0.77 mg/dL 가 2 CRP 1.06 CRP 7 , 10 , 14  
 7.54 mg/dL 7 CRP 6.89 mg/dL (P<0.0001) 440  
 7.46 mg/dL 5.03 mg/dL 2 CRP  
 (Table 5).



**Fig. 1.** Serial change of CRP before and after thoracolumbar surgery.

- (A) Deep wound infection after thoracolumbar surgery  
 A1: true positive - suction drainage tip culture positive  
 A2: false negative - suction drainage tip culture negative  
 (B) No infection after thoracolumbar surgery  
 B1: false positive - suction drainage tip culture positive  
 B2: true negative - suction drainage tip culture negative

**Table 5.** Serial change of CRP before and after thoracolumbar surgery

Group No.		preOP	POP 3rd day	POP 7th day	POP 10th day	POP 14th day
A	A1	0.78	10.82	6.89	6.32	7.46
	A2	0.41	10.37	7.54	6.53	5.03
B	B1	0.45	9.56	3.74	2.34	1.06
	B2	0.35	8.78	2.36	2.24	0.77

A: Deep wound infection after thoracolumbar surgery  
 A1: true positive - suction drainage tip culture positive  
 A2: false negative - suction drainage tip culture negative  
 B: No infection after thoracolumbar surgery  
 B1: false positive - suction drainage tip culture positive  
 B2: true negative - suction drainage tip culture negative

(virulence) type A protein  
toxin  
가  
가  
staphylococcus aureus가 가  
1%  
10)  
7%가  
7,11)  
가  
가  
가  
17 가  
Coagulase negative staphylococ-  
cus . S. epidermidis S. saprophyticus<sup>18)</sup> Coagulase  
negative Staphylococcus  
가  
Dietz<sup>14)</sup>  
33%  
30% S. epidermidis  
가  
1  
broth  
Dietz<sup>14)</sup> ,  
25%  
14)  
가  
11)  
Staphylo-  
coccus aureus  
coagulase negative staphylo-  
coccus<sup>15)</sup>  
19,20)  
(sensitivity) 52.6%, (speci-  
ficity) 96.3%,  
37.0% ,  
(negative predictive value) 98.0%  
(Table 4).  
가  
가  
가  
Staphylococcus aureus  
가  
16,17). Staphylococcus aureus<sup>18)</sup>  
Staphylococcus  
epidermidis coagulase negative staphylococcus CRP ,

CRP  
가

3

1

14

21,22)

CRP

7

가

가

Staphylococcus aureus

22)

3

14

7.47 mg/dL

5.03 mg/dL

3

9.63 mg/dL 8.78 mg/dL

7

mg/dL 0.77 mg/dL

가

14

1.06

가

7

가

Coagulase negative staphylococcus

CRP

가

CRP가

가

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가 가  
471  
C-reactive protein  
4.0% 14  
10 Staphylococcus aureus (methicillin-resistant Staphylococcus aureus 2 )가  
3 가 Coagulase negative staphylococcus가 5 가  
(sensitivity) 52.6%, (specificity) 96.3%, (positive predictive value)  
37.0%, (negative predictive value) 98.0% C-reactive protein  
7 , 10 , 14 가  
가  
C-

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