

# Paclitaxel

# 가

1

:

2 . . . . . 3 . 4 . Zhenhai Di .

: Paclitaxel

가

가

: 9

paclitaxel

(drug stent, DS) 1 1

9

DS

(control stent, CS)

12

/ , ,

:

가

CS 1

8

. 4 (DS 1 , CS 3 )

3 - 5

8

DS 5

CS

/

DS

CS

DS

CS

( , 3.63 - mm vs. 4.37 - mm)

( , 1.75 - mm vs. 2.78 mm)

:

: Paclitaxel

10

가

80%

(1 - 5).

(4 - 7).

(tumor ingrowth)

(tissue hyperplasia)

(1, 5).

(6 - 8).

가

(2 -

5).

가

가

가

paclitaxel

balloon injury

paclitaxel

This study was supported by a grant (#R01 - 2003 - 000 - 11716 - 0) from the Korea Science and Engineering Foundation, Republic of Korea, and by a grant (2003 Young Investigator Award) from Korean Society of Cardiovascular and Interventional Radiology.

2004 8 23 2005 3 30

(9 - 11),

가 (12).

paclitaxel

가

0.15 - mm 20 - mm,

50 - mm 가 (Fig. 1).

paclitaxel (drug stent,

DS) (control stent, CS)

DS

mm 25 - mm

가 CS

25 - mm paclitaxel

25 - mm

DS

paclitaxel

lipiodol (lipiodol, Guerbet BP, Roissy CdG Cedex, France) cremophor EL (polyoxyl castor oil, 1 (0.3 g):2.5 (0.75 g)

, 30 - 40 1 가

paclitaxel ( , , )

lipiodol 0.5 0.15 g 가 tetrahy -

drofurane (THF, , )

(ChronoFlex AR; Cardiotech International, Woburn, Mass)

5 (30 g):1 (6 g) 66 가

CS paclitaxel

tetrahy -

drofurane 66 가 16%

epolene wax

(mold) 가

40 가 24

tetrahydrofurane

Paclitaxel

paclitaxel

Paclitaxel 1 -  $\mu$ g, 10 -  $\mu$ g, 100 -  $\mu$ g

(high-performance liquid chromatography, Rainin Instrument Co., U.S.A.)

pacli -

: Paclitaxel 가

taxel

DS 1 pH 7.0

PBS (phosphate buffered saline, Sigma Aldrich) 20 - ml

37 60 - rpm DS

paclitaxel paclitaxel

PBS 20 - ml , 24

PBS paclitaxel

paclitaxel

235 nm

32

20 - 25 - kg 18 9

DS CS

kg 12.5 - mg ketamine hydrochloride (

, , ) atrophine ( , , ) 0.5 -

mg xylazine hydrochloride (

, , )

8 - mm (sheath), 4 - mm

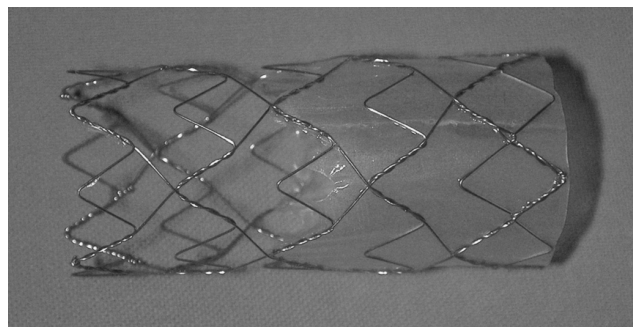
(breathing tube), (pusher catheter),

(10 - mm , 2 cm )

(13).

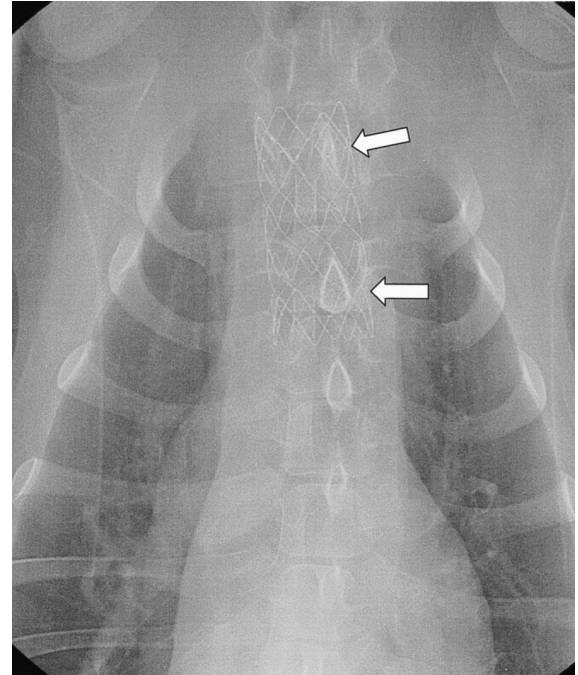
0.035 - inch (guide

wire; Terumo, Tokyo, Japan)

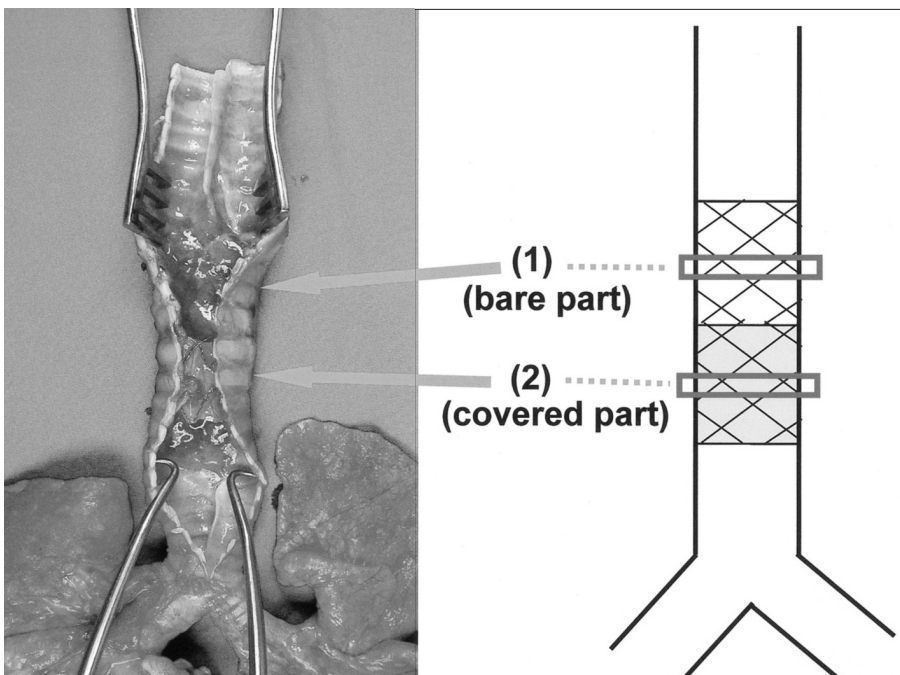


**Fig. 1.** Photograph of a nitinol stent consisting of covered part and bare part.

na 3 - cm 가 cari - (mild) (mild) (severe) 5  
 (Fig. 2). 100 , 40  
 8 DS CS 가  
 12  
 12 xylazine hydrochloride 가  
 (Fig. 3). 10%  
 . 10% 가  
 4 - 10 -  $\mu$ m hematoxylin -  
 eosin / (epithelial erosion/ulcer),  
 (granulation tissue thickness),  
 (inflammatory cell infiltration) /  
 (basement membrane)  
 mm  
 가



**Fig. 2.** Fluoroscopic image obtained after stent (arrows) placement in a canine trachea. The lower margin of the stent is located 3-cm apart from the carina.



**Fig. 3.** Gross findings and locations of tissue samples for histologic examinations. The longitudinally opened trachea matches the schematic figure showing the location of tissue samples obtained from the mid-portion of the bare part (1) and covered part (2).

DS CS  
/ , ,  
가 Mann - Whitney U test  
 $p < 0.05$  가  
SPSS version 10.0 statistical package (SPSS Inc.,  
Chicago, IL)

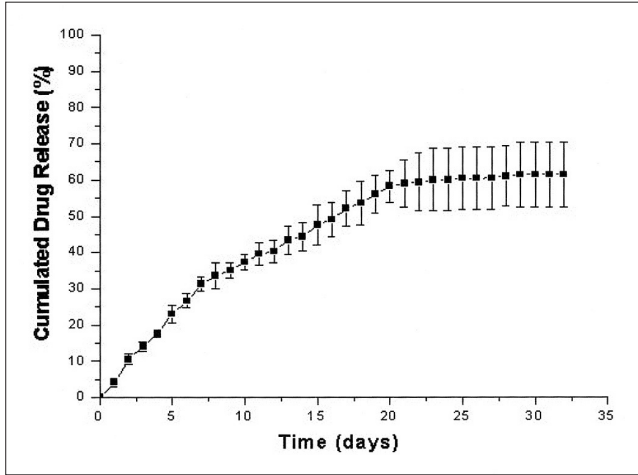
2,500 -  $\mu$ g paclitaxel  
61.45%  
1536.25 -  $\mu$ g  
Fig. 4 1  
30%가 3 60%  
. 3 5%  
(malpositioning)  
8 12  
(stridor) . CS  
8 가  
3 5 4 (DS 1  
, CS 3 )가  
DS 8 , CS 5  
13 12

**Table 1.** Pathologic Findings in the Trachea of 13 Sacrificed Dogs 12 Weeks Following Stent Placement

	Epithelial erosion/ulcer (%)		
	DS	CS	p-value
Bare part	66.43 $\pm$ 11.80	51.00 $\pm$ 28.81	0.28
Covered part	62.86 $\pm$ 19.76	45.00 $\pm$ 27.39	0.22
	Granulation tissue thickness (mm)		
	DS	CS	p-value
Bare part	3.63 $\pm$ 1.33	4.37 $\pm$ 0.38	0.37
Covered part	1.75 $\pm$ 0.59	2.78 $\pm$ 0.13	0.17
	Inflammatory cell infiltration (Grade 1 - 5)*		
	DS	CS	p-value
Bare part	4.43 $\pm$ 0.53	3.80 $\pm$ 0.45	0.06
Covered part	4.29 $\pm$ 0.76	3.80 $\pm$ 1.30	0.55

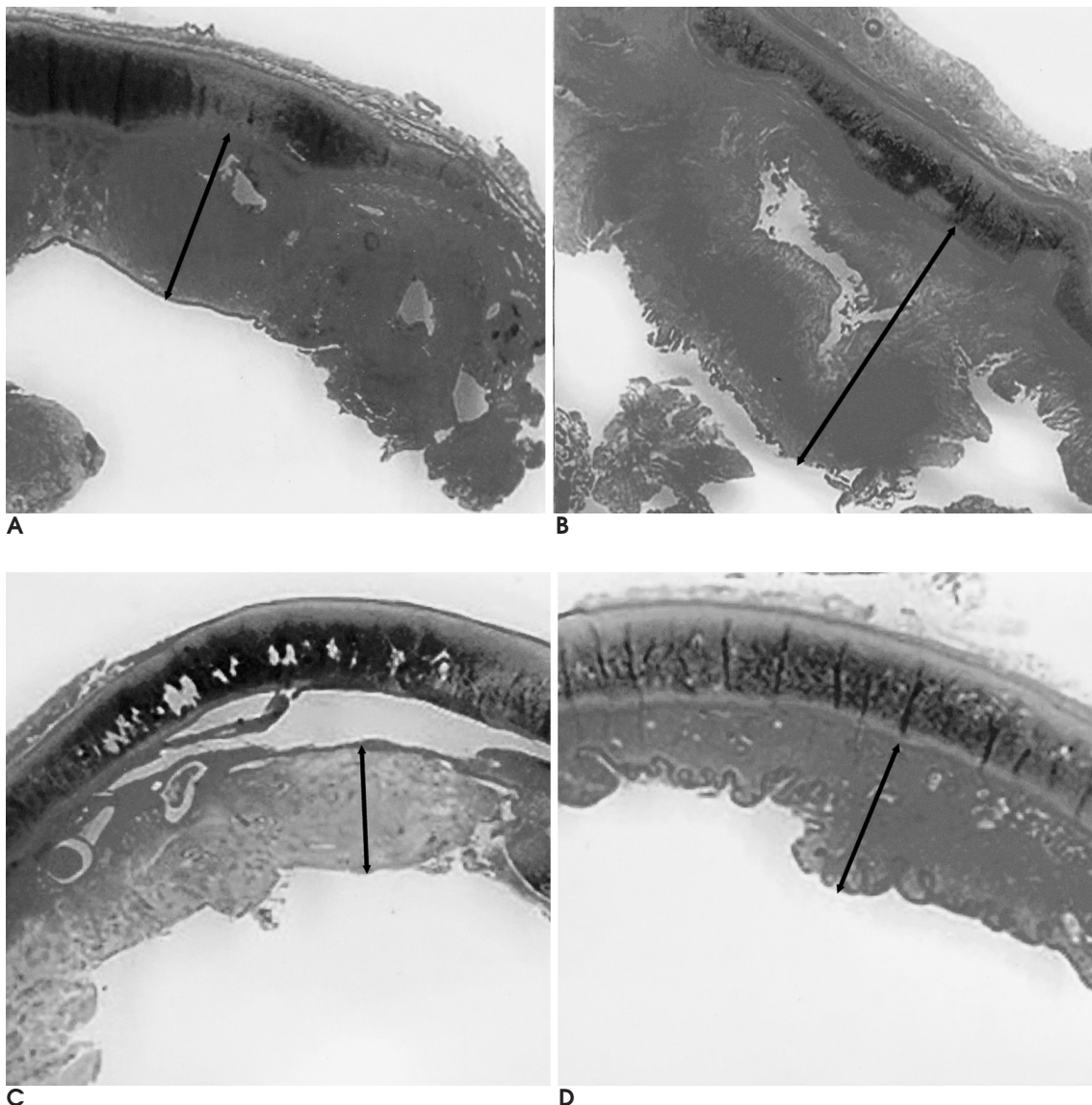
Note. - Results are reported as mean  $\pm$  standard deviation  
DS = drug stent (paclitaxel-eluting stent), CS = control stent.  
\* Grade 1 = mild, Grade 2 = mild to moderate, Grade 3 = moderate, Grade 4 = moderate to severe, and Grade 5 = severe.

DS, CS  
가  
가  
DS CS  
Table 1  
/ DS  
가 66.43% 62.86%, CS  
51.00% 45.00%  
DS CS DS가 CS  
/ DS  
가 3.63 - mm 1.75 - mm, CS  
4.37 - mm 2.78 - mm  
DS CS DS가 CS  
DS  
가 4.43 4.29, CS 3.80 3.80  
DS CS DS가 CS  
가 (1 - 5, 7, 8).



**Fig. 4.** Cumulative drug release curve from paclitaxel-eluting covered stent.

drugs; )  
 (eluting matrices; )  
 (4, 6, 8, 13).  
 Paclitaxel  
 (microtubule) (assembly)  
 (polymerization)  
 G2 / M  
 (14 -  
 16). paclitaxel  
 가  
 (15). (immobilized)  
 paclitaxel  
 . Kalinowski (18) human epithelial  
 gallbladder cell, human fibroblasts, pancreatic car -  
 cinoma cell paclitaxel  
 (dose - dependent inhibition)



**Fig. 5.** Microscope findings of representative pathologic specimens (H & E, × 40).  
**A.** Bare part of the paclitaxel-eluting stent.  
**B.** Bare part of the control stent.  
**C.** Covered part of the paclitaxel-eluting stent, and **(D)** Covered part of the control stent. The granulation tissue thickness (calibers) of the paclitaxel-eluting stents is slightly less than that of the control stents in either bare part or covered part.

: Paclitaxel 가  
 Song (19) paclitaxel (21). paclitaxel  
 paclitaxel 가 paclitaxel  
 50% (targeting)  
 advantage) paclitaxel  
 . . Shin (12)  
 paclitaxel 가 (pap -  
 . Shin (12) illary projection)  
 가 paclitaxel DS가 CS  
 paclitaxel paclitaxel  
 paclitaxel 가 paclitaxel 가  
 가 가 paclitaxel  
 (12). 가  
 / DS가 CS  
 / 가  
 / paclitaxel (24).  
 / DS가  
 가 CS  
 (13, 20). 가 가 paclitaxel  
 가 / DS CS 가  
 (13, 20), 가 (12). paclitaxel  
 paclitaxel 가 (inflammatory cascade)  
 / 12 (16) DS 가  
 DS 가 paclitaxel  
 가 paclitaxel 가  
 가 paclitaxel 가  
 12 DS CS 50% 가  
 / paclitaxel 가  
 가 (edge)  
 가 paclitaxel  
 DS CS 가 pacli -  
 taxel 가  
 , (resin block)  
 (wound healing)  
 (21) 가  
 ,  
 ,  
 (22, 23) 1 - 3 가  
 (re - epithelialization)  
 (re - endothelialization) Paclitaxel



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## Influence of a Paclitaxel-eluting Expandable Metallic Stent on Tissue Hyperplasia: An Experimental Study in a Canine Tracheal Model<sup>1</sup>

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**Purpose:** To evaluate the efficacy of a paclitaxel-eluting expandable metallic stent in reducing tissue hyperplasia following stent placement in a canine tracheal model.

**Materials and Methods:** Nine paclitaxel-eluting stents (drug stent, DS) consisting of a proximal bare part and a distal polyurethane-covered part were placed in the trachea of nine dogs and nine control stents (control stent, CS) were placed in the other nine dogs. The dogs were scheduled to be sacrificed 12 weeks after stent placement. Gross and histological factors, such as epithelial erosion/ulcer, granulation tissue thickness and inflammatory cell infiltration were evaluated after each dog was sacrificed.

**Results:** There were no procedure-related complications or malpositioning of any of the stents. One CS migrated less than eight weeks following stent placement. Four dogs (one DS and three CS dogs) died between three and five weeks following stent placement. Therefore, pathologic specimens were obtained from eight DS and five CS dogs. Epithelial erosion/ulcer or inflammatory cell infiltration was slightly more prominent in the DS cases than in the CS cases, in both the bare part and the covered part. However, the data was not statistically significant. Granulation tissue thickness was lower in the DS cases than in the CS cases in both the bare part (mean, 3.63-mm vs. 4.37-mm) and the covered part (mean, 1.75-mm vs. 2.78 mm), but the data was also statistically insignificant.

**Conclusion:** Although the data was not statistically significant, placement of paclitaxel-eluting expandable metallic stent demonstrates a tendency toward a decrease in granulation tissue thickness in canine tracheal models.

**Index words :** Drug, effects  
Stents and prostheses  
Trachea, interventional procedure

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