

가

:

1

2

3

: , 가 가 (covered retrievable tracheo-
bronchial nitinol stent)
: 10 , 0.2mm
2cm, 20mm 22mm가

1

(N=5) 2 (N=5) , (hook wire)

: 1 2 11
. 9 10 4 가 (40%), 6 5
가 가 (83%). 1 2 ,
가 . 5
, 3

: 가
가

(trachea) (bronchus) 가 가 , 가
(migration) (15,30), 가
. 1986 Wallace (1) 가 , (tumor in-
growth)

Gianturco 가
, Gianturco(Z) , Wallstent 가 가 가
(self-expandable metallic stent)
가 (2-18).
가 가 ,
(balloon-expandable metallic stent) Palmaz
(19-21), (silicone) (22-26) ,
(Nitinol)
가 (27-29). 20-32kg(25kg)
10.5-21.0mm
15.2mm (Table 1).

1
2
3
1999 1 3 1999 3 10 . 0.2mm (Figs. 1,2,3)
(nitinol wire, EUROflex,

U.S.A.)

(drawstring)
(stent delivery set) 5F vascular
catheter(Cobra or Headhunter, COOK, Bloomington, IN,
U.S.A.), 8mm (introducer)
6.75mm (pusher), 10mm (balloon: PEMT,
Medi-Tech, Watertown, MA, USA or Olbert, Boston Scientific,
Boston, MA, U.S.A.)
(stent retrieval set)
5mm (dilatator), (hook wire)

(Fig. 4A-D)

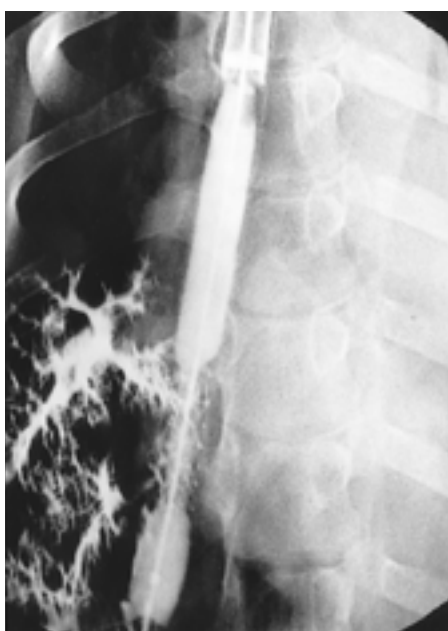
24
1kg ketamine(,)
20mg
atropine(,) 0.5mg
1kg thiopental sodium(,) 500mg 5%
500cc
thiopental sodium 1kg 15mg



A



B



C



D

Fig. 4. A-D Stent placement.

A. The guide wire is inserted into the right main bronchus.

B. A small amount of contrast media is injected through a vascular catheter to identify the bronchus intermedius.

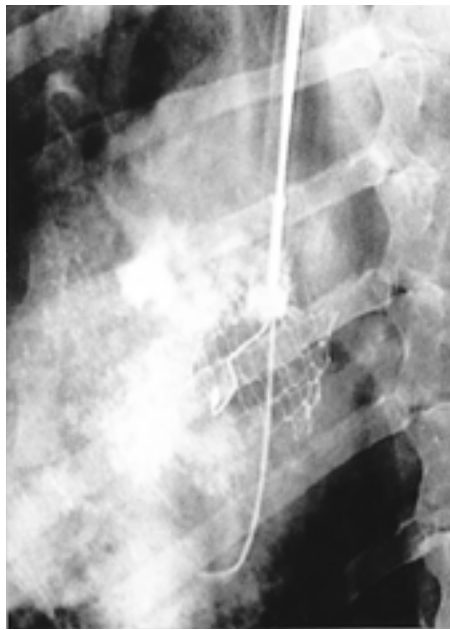
C. The stent delivery set with a compressed stent is inserted into the bronchus intermedius.

D. The stent is expanded in the bronchus intermedius.

가 : 가
 가 (pusher) 가
 0.035 (guide wire, 가
 Terumo, Tokyo, Japan) 가
 가
 1 cm
 (measure catheter, COOK, Bloomington, IN, U.S.A.)
 2
 가 1 2 5
 가
 Stiff guide wire(COOK, Bloomington, IN, U.S.A.)
 가



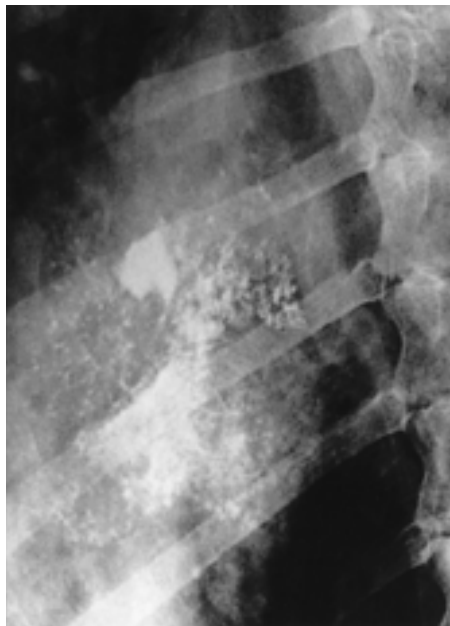
A



B



C



D

Fig. 5. A-D Stent removal
 A. The guide wire is inserted into the right main bronchus.
 B. The stent retrieval set is inserted.
 C. The hook wire is used to grasp the drawstring so that the proximal part of the stent could be contracted.
 D. The stent was removed.

가 (Fig. 5A-D) 6 가 10
24 , 4 (: 40%). 1 22mm
. X-ray fluoroscopy 3 가 가
가
(Table 2)
6 , 5
(1 3 , 2
2), 22mm 1
가
thiopental sodium 1kg 70mg (: 83%, 5/6). 1 (N=4) 2
(N=5) (mucus)
가 가 (Figs. 6,7).
가 가 2mm
5
가
가 3 (right
middle lobe) 가 1
가
1 2 11 1
(: (SBR: 2.33), 1
100%, 11/11). 1 20mm (SBR: 3.17).
22mm
1

Table 2. Pathology of Bronchial Lumen and lung after Stent Removal.

	Follow-up period(months)	Stent removal	Complication	Gross morphology of bronchial lumen(granulation tissue)	Histologic finding (change of the lung)
1	1	Yes		Mild	
2	1	Yes		Severe, Destructed bronchial cartilage	Pneumonia in LUL, RUL RML
3	1	Yes		Severe	Pneumonia in RML
4	1	No	migration	Mild	Pneumonia in RML
5	1	No	dead		
6	2	No	initial migration (20mm)	Mild	
7	2	Yes		Severe	Obstruction of RLL bronchus
8	2	Yes		Severe	
9	2	No	migration	Mild	
10	2	No	migration	No	

LUL : left upper lobe, RUL : right upper lobe, RML : right middle lobe

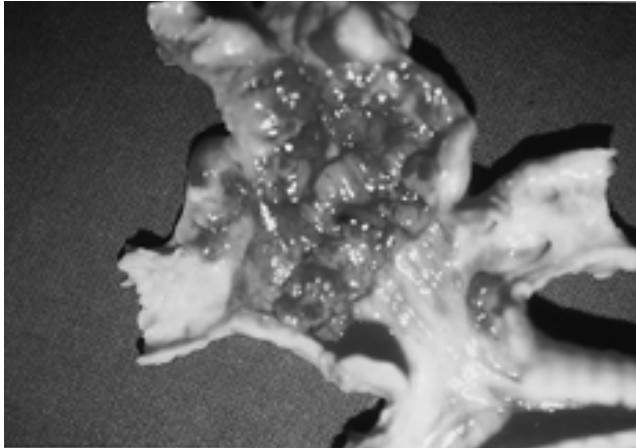


Fig. 6. Gross pathology of the stented bronchus. There are red-colored granulation tissues in the stented bronchus intermedius as well as the areas above and below the stent placed.

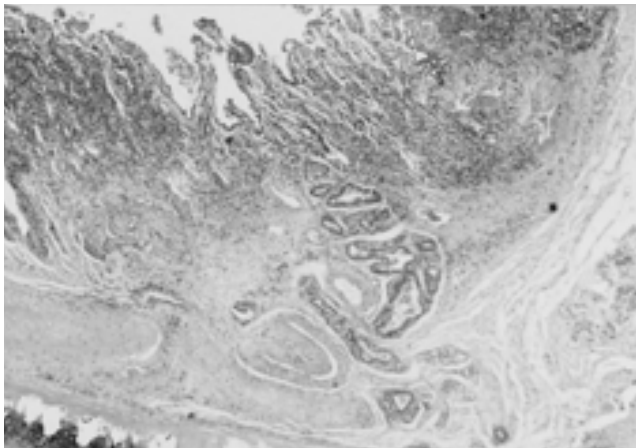


Fig. 7. Histopathologic findings of the stented bronchus intermedius. There are severe hyperplasia of the bronchial epithelium and infiltration of inflammatory cells in the submucosal areas (hematoxylin and eosin stain, $\times 40$)

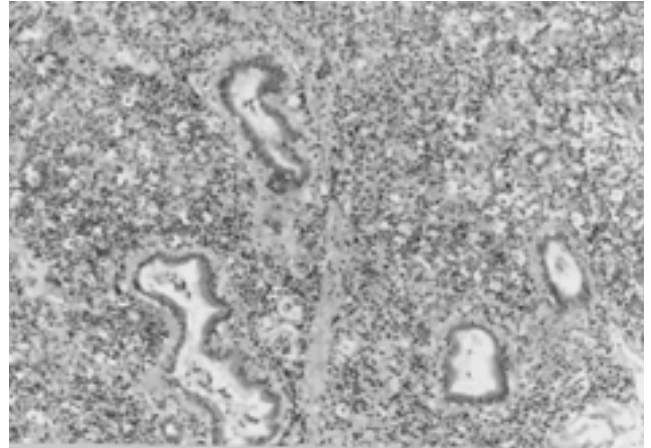


Fig. 8. Histopathologic findings of the lung with pneumonia. Decreased alveolar spaces and infiltrations of inflammatory cells are noted (hematoxylin and eosin stain, $\times 40$)

가 mucociliary action 1.5-2.0cm, 0.5-1.2cm 가

(expandable metallic stent) (1-3,9-14,16,17). tumor ingrowth

가 (1,5- Wallace (1), Rousseau (8). (18).

7,10,12,14,18,21). 11 3 1/3 7 1 가 가

가 (loosening) 가 (30), Nitinol 가 (nickel-titanium alloy)

가 Nitinol (27,28), DeRowe (subglottic stenosis) 가 (29), in-troducer

가 (covered stent) (31) Gianturco (bare stent 83%(6 1), 5 3 가 tracheobronchial mucociliary transport tumor ingrowth 가 (5,6,10,12,13,18,31-33). Petersen

1999;40: 1095- 1103

2 silicone-covered Z-stent
(14), Nomori dacron mesh
tumor ingrowth
(6), Kishi dacron mesh Z-s-
tent tumor ingrowth
(32)
Miyayama Z-stent
tumor가 tumor in-
(33).
83%(5/6)
가
(migration)
(bare stent)
(3,4,11,12,14,15,17).
10 4
가
가 (bare
(implantation)
(1,3,6,14,18,31)
1 3
2
가
20 22 mm
가
11.6mm (stent bronchus ratio,
SBR) 1.72 1.89 Irving
(stent trachea ratio, STR) 1.15-1.25
(34), STR 1.4-1.5
SBR 2.5-3.0
(3), 가
가 SBR 2.33 , 가 SBR
3.17
STR 2.0 (4), SBR
STR
가
가

- 가
가
mucociliary transport 가
가
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A Retrievable Nitinol Endobronchial Stent: An Experimental Study in Dog¹

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Purpose: The purpose of this study was to evaluate the safety and the retrievability of a new covered retrievable nitinol tracheobronchial stent.

Materials and Methods: Stents were knitted from 0.2mm nitinol wire, covered with polyurethane, and were 20-22mm in diameter and 2cm in length. Under fluoroscopic guidance, a stent was placed in the normal right bronchus intermedius of ten dogs. Using a retrieval hook, stent retrieval was attempted after 1 month(N= 5) or 2 months(N= 5). After removal, the dogs were sacrificed and their tracheobronchial trees were examined grossly and histologically.

Results: Eleven stents were successfully placed in ten dogs. Migration and expectoration occurred in four of ten stents in nine dogs(40%). Five stents were successfully removed from six dogs(83%). Without significant difference between the two groups, mild to moderate mucosal hyperplasia was noted at the sites of stents as well as above and below them. On microscopy, three of five dogs showed pneumonia in the right middle lobes, but none of the stents was covered with epithelium.

Conclusion: Temporary placement of a covered expandable nitinol stent in the tracheobronchial tree is feasible, but to establish its efficacy, further experimental studies are needed.

Index words: Bronchi, stents and prosthesis
Bronchi, stents, experimental study
Bronchi, stenosis or obstruction

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