

## Uncut Roux

### Clinical Results and Histologic Change on Animal Model with Modified Uncut Roux Reconstruction after Gastrectomy

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**Purpose:** The uncut Roux operation prevents the Roux stasis syndrome by preserving neuromuscular continuity between the proximal jejunum and the Roux limb, but this technique has an unacceptably high incidence of dehiscence of the staple lines with subsequent reflux gastritis or esophagitis. The authors designed a modified uncut procedure to avoid dehiscence of the staple lines. The aim of this study was to review whether this technique might be useful by examining the histologic change on animal study and the postoperative radiologic study of patients with modified uncut reconstruction.

**Methods:** Between February 1997 and December 2000, the UGI study was reviewed in 213 patients undergoing the modified uncut Roux reconstruction at Soonchunhyang University Hospital, Chunan, Korea, at 2 and 8 weeks after operation, to evaluate the incidence of dehiscence and the leakage of staple lines. Animal study included ten pigs, 5 underwent conventional uncut Roux procedure with staple, while the other 5 received reinforcing whole layer suture with black silk on the staple lines. The animals then underwent a second operation at 15 days after operation to evaluate

histologic change and dehiscence of staple lines.

**Results:** Dehiscence and leakage were not found in any of the 213 patients undergoing modified uncut Roux reconstruction. In the animal study, 2 of 5 cases (40%) receiving conventional uncut Roux reconstruction had dehiscence, whereas dehiscence was absent in all 5 cases receiving modified uncut Roux reconstruction and these 5 animals showed more marked infiltration of inflammatory cells, vascular formation and more severe fibrosis on histologic examination.

**Conclusion:** The conventional uncut Roux procedure suffer dehiscence of the staple lines with subsequent reflux gastritis or esophagitis. Therefore, modified uncut Roux reconstruction might prevent a jejunal leakage in the case of staple line dehiscence and might prevent dehiscence of staple lines. (*J Korean Surg Soc* 2002;63:187-192)

**Key Words:** Uncut Roux reconstruction, Dehiscence  
: Uncut Roux

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: 2002 6 17 , : 2002 7 31  
2001

2002

, Dumping  
Roux-en-Y  
30%  
Roux stasis  
Roux stasis  
pacemaker potential Roux  
Roux stasis  
1988 Van Stiegmann Goff  
Roux-en-Y

uncut Roux-en-Y

45 cm - uncut 213

가 5 staple uncut , 5

pacemaker potential staple black silk 4 uncut

Roux Roux . Fig. 1 uncut

Roux . Fig. 1 -

stasis - 30 cm 5 cm -

1990 uncut Roux procedure 20 cm TA stapler (USSC)

loop myoneural continuity 30 4.8 mm stapling , staple line black silk 4 3 .

Roux stasis staple dehiscence leakage . uncut 213 2 8

1997 staple staple line

5 . 15

uncut staple 23 staple line staple line

38.9%, silk 5 18

34.8% 가

(I) uncut 가

, 1997

uncut Roux

213 59.5 가 130 ,

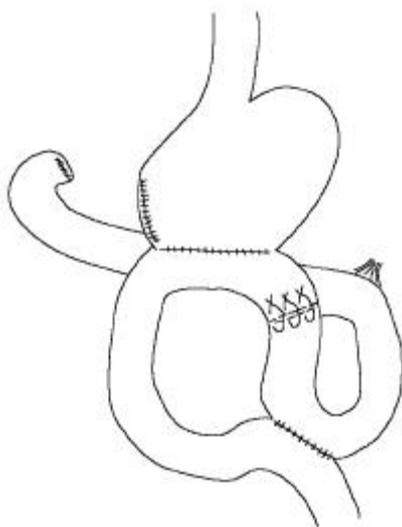
가 83 . 가 124 ,

가 36 , 가 53 1 가 11 , 2 가 42 ,

3 가 127 4 33 .

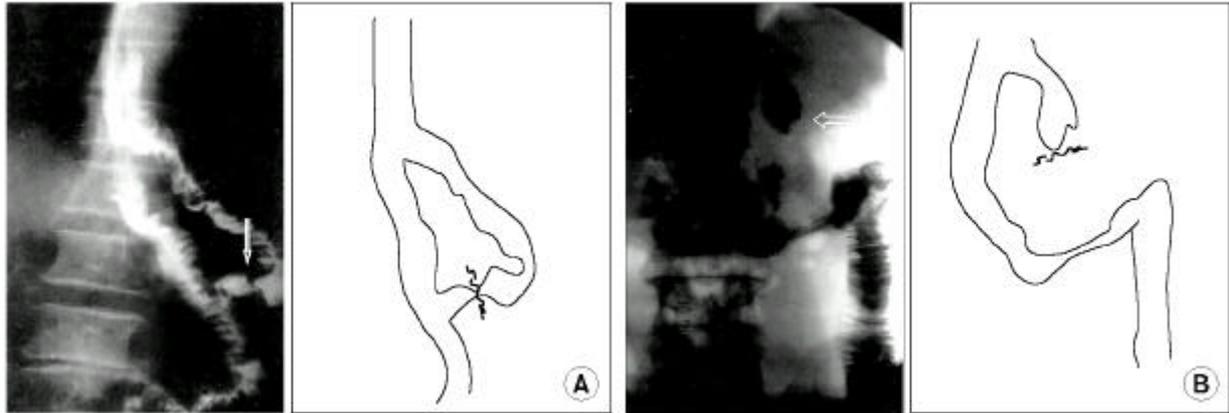
**Table 1.** Clinicopathologic features of patients

Variables	No. of patients (%)
Age, year (Mean)	59.5
Sex	
Male	130 (61.0)
Female	83 (39.0)
Location	
Upper	124/213 (58.2)
Middle	36/213 (17.0)
Lower	53/213 (24.8)
Depth of invasion	
T1	12/213 (5.6)
T2	43/213 (20.2)
T3	125/213 (58.7)
T4	33/213 (15.5)
Stage (UICC)	
I	11/213 (5.2)
II	42/213 (19.7)
III	127/213 (59.6)
IV	33/213 (15.5)
Extent of resection	
Total gastrectomy	136/213 (76.2)
Subtotal gastrectomy	77/213 (23.8)



**Fig. 1.** Modified uncut Roux reconstruction using reinforcing whole layer suture with black silk on the staple line.

1997 1 2000 12 612



**Fig. 2.** UGI study. The passage of contrast media through the conventional uncut Roux procedure was identified (A). The passage of contrast media through reinforcing whole layer suture with black silk on the staple line was not identified (B).

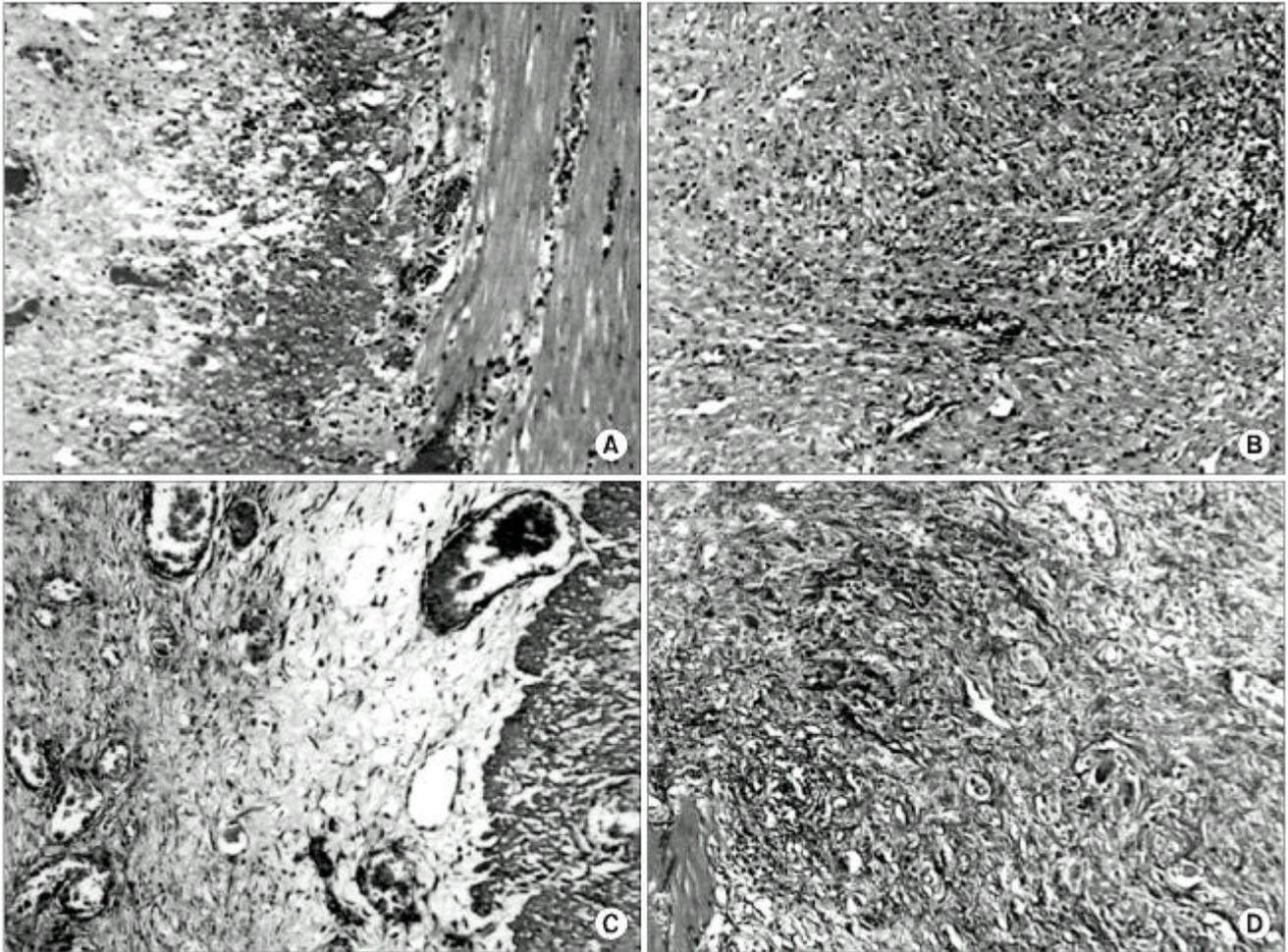
**Table 2.** Dehiscence rate on animal study (N=10)

	Dehiscence	Intact	Total
Conventional uncut*	2 (40%)	3	5
Modified uncut*	0	5	5

\*Uncut = uncut Roux-en-Y reconstruction.

136 , 77 (Table 1).  
 (I) uncut 가  
 uncut Roux 23 8 (34.8%) (Fig. 2A)  
 8 213 2  
 (Fig.  
 2B). Roux stasis uncut  
 uncut uncut  
 15 uncut  
 40% uncut  
 가 (Table 2).  
 15 staple line HE stain 200  
 uncut uncut  
 가  
 . Collagen fiber Masson trichrome stain 30%  
 uncut uncut  
 collagen fiber (Fig. 3).  
 (13) Roux stasis  
 Roux-en-Y 가

가  
 Moyinihan(2)  
 (Braun ) 가  
 가 .(3) 1947 Orr(4)  
 Roux-en-Y  
 ,(5) 1952 Hunt  
 . 1957 Von A. Plenk(6)  
 Braun  
 1  
 가  
 . 1962 Lawrence(7) Hunt Orr  
 Roux-en-Y -  
 , 1973 Paulino (8) Hunt-Lawrence-pouch  
 Roux-en-Y - 가  
 .(9,10)  
 Roux-en-Y (11) (12)  
 .  
 Roux stasis  
 Roux-en-Y 가



**Fig. 3.** Histologic staining of staple line on animal model. B (modified uncut procedure) shows more marked infiltration of inflammatory cells and vascular formation than A (conventional uncut procedure) on H&E stain ( $\times 200$ ). D (modified uncut procedure) shows more severe fibrosis than C (conventional uncut procedure) on Masson trichrome stain ( $\times 200$ ).

Roux	Roux-en-Y	Roux limb	Stiegmann	Goff(15)	Roux-en-Y	1988	van
				"uncut"	Roux procedure		
Roux	Roux		-			45 cm	
	Roux-en-Y		-				
		(13)		가	staple line		
Roux-en-Y				staple line		Roux limb	
		Roux limb					
		stasis					
Roux limb					pacemaker	Roux limb	
Roux stasis	Roux limb				Roux stasis		
pacemaker		Roux		Miedema	(16)		uncut
limb	ectopic pacemaker가				가	staple line	uncut
pacesetter potentials			Roux-en-Y				
가	(14)		Roux limb	myoneural	continuity		

ectopic pacemaker , Roux staple line  
 limb . Van Stieg- (1)  
 mann (15) uncut Roux limb uncut

Nguyen Tu (17) uncut Roux . Staple line  
 14 1 36% 5 staple line .(22)

conventional Roux limb staple dehiscence staple line dehiscence uncut  
 staple line dehiscence

, Mulholland (18) staple line 14 uncut staple line 가  
 . uncut Roux-en-Y uncut , staple line  
 Myoneural continuity  
 staple line dehiscence uncut uncut  
 . 1995 Tu (17) Roux stasis  
 가 staple de-  
 hiscence  
 , 1988  
 (19) , Braun

Kim's method , 1994 (20)  
 Plenk 99 Roux- uncut staple line  
 en-Y 가 가  
 44.8% 가  
 , stapling technique  
 uncut staple line collagen  
 (16) uncut Roux 가

staple line .  
 (17) uncut Roux Roux stasis

(21) Uncut Roux limb  
 conventional Roux-en-Y reconstruction Roux

1997 Uncut Roux 41 ,  
 staple 23 5  
 18  
 8 (34.8%), 7 (38.9%)  
 Delayed gastric emptying  
 staple  
 가 .(1) uncut Roux

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