Enteroskopi

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31.Ulusal Gastroenteroloji Haftası, 2014, Antalya

Konuşmanın Başlıkları

1. Enteroskopi çeşitleri
2. Endikasyonlar, komplikasyonlar ve kontrendikasyonlar
3. Enteroskopide en sık rastlanan lezyonlar
4. Klinik uygulamalar
5. İnce barsak dışı kullanımı
6. Kocaeli Üniversitesi deneyimi

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1. Enteroskopi çeşitleri

1. “Double balon” enteroskopi
2. “Single balon” enteroskopi
3. “Spiral” enteroskopi

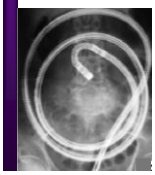
“Double” Balon Enteroskopi

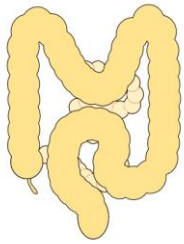
	EN-450T5	EN-450P5/20	EC-450BI5
Viewing direction	Forward	Forward	Forward
Observation range	4 - 100mm	5 - 100mm	3 - 100mm
Field of view	140°	120°	140°
Distal end diameter	9.4mm	8.5mm	9.4mm
Flexible portion diameter	9.3mm	8.5mm	9.3mm
Bending capability			
Up	180°	180°	180°
Down	180°	180°	180°
Left	160°	160°	160°
Right	160°	160°	160°
Forcep channel diameter	2.8mm	2.2mm	2.8mm
Working length	2,000mm	2,000mm	1,520mm
Total length	2,300mm	2,300mm	1,820mm
Recommended System	EPX-4440HD	EPX-4440HD	EPX-4440HD

“Double” Balon Enteroskopi

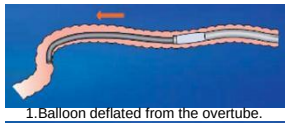
Anterograde DBE

Retrograde DBE

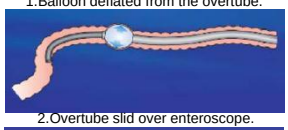




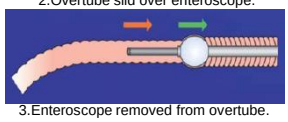
“Single” Balon Enteroskopi



1.Balloon deflated from the overtube.



2.Overtube slid over enteroscope.



3.Enteroscope removed from overtube.

“Spiral” Enteroskopi

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Endikasyonlar (Tanısal)

- Standart endoskopilerle ulaşılamayan ince barsakların değerlendirilmesi
  - Sebebi izah edilemeyen **GİS kanamalar**
  - Sebebi izah edilemeyen **karın ağrıları**
  - **Kronik diyare** ve malabsorpsiyon sendromlarının araştırılması
- Radyolojik tanı yöntemleri (X-ray, BT, MR) ile saptanan ince barsak anormalliklerinin araştırılması
- Uygulanmakta olan tedavilerin etkinliklerinin değerlendirilmesi (Çölyak ve Crohn hastalığı gibi)
- Cerrahi olarak tedavi edilecek ince barsak lezyonlarının lokalizasyonun saptanarak işaretlenmesi
- Striktür veya darlık nedeniyle zor kolonoskopilerin yapılması

Endikasyonlar (Tedavi)

- İnce barsak anjioektazi veya AV malformasyonlara müdahale edilmesi
- Yabancı cisimlerin (örn.kapsül) veya poliplerin (örn.Peutz-Jeghers Sendromu, Juvenile Polipozis) çıkartılması
- Crohn hastalığı, cerrahi veya ilaçlara bağlı (NSAİİ) darlık veya stenozların dilatasyonu, stent yerleştirme
- Beslenme tüpü yerleştirme (direkt jejunostomi)

Endikasyonlar (Tedavi)

- Bariyetrik cerrahi nedeniyle GİS traktüsteki anatomik değişiklikler nedeniyle endoskopik tanı ve tedavi işlemleri (EMR, ESD, darlıkların dilatasyonu ve ERCP vs..)
- Billroth II veya Roux en Y operasyonlu hastalar
  - Karaciğer-safra yolları ve pankreas hastalarında özellikle ERCP ye ait tanı ve tedavilerin uygulanması
  - Karaciğer transplantasyonu yapılmış intrahepatik safra yolları veya hepatiko-jejunostomi darlıklarının tedavisi

Komplikasyonlar

DBE oldukça güvenilir bir işlem olup, ciddi yan etki ve komplikasyonlar oldukça nadirdir

En sık görülen yan etkiler;

- **boğazda ağrı**
- **karın şişkinliği**
- **bulantı**
- **küçük kanama**

Bu yan etkiler genellikle hafif olup, 12-24 saat içerisinde düzelirler

Nadiren görülenler;

- **perforasyon**
- **büyük (majör) kanama**
- **pankreatit**

Kontrendikasyonlar

DBE aşağıdaki durumlarda yapılamaz yahut da kontrendikedir:

- Obezite
- Gebelik
- Ciddi kardiyak ve solunum sistemi hastalığı olanlar
- Multiple ince barsak adezyonu olanlar
- Antikoagülan ilaçlar alıyor ve bırakılamıyorsa

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Enteroskopide Sık Rastlanan İnce Barsak Lezyonları

Vasküler	İnflamatuvar	Neoplastik
•Anjioektazi	•İBH	•Karsinoid
•Hemanjiom	•NSAİ enteropati	•GİST
•Dieulafoy lezyon	•Çölyak hastalığı	•Polip
•PH enteropati	•Otoimmun enteropati	•Adenokarsinom
•Varisler		•Lenfoma
•Radyasyon enteriti		•Metastazlar

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Incidence of bleeding lesions within reach of conventional upper and lower endoscopes in patients undergoing DBE for obscure gastrointestinal bleeding

107 hasta, 143 DBE işlemi ("obscure overt" *(n=85)* ve "obscure occult " *(n=22)*) GİK. GİK'nın ***muhtemel*** nedeni olarak 51 hastada (%47.6), ***kesin*** nedeni olarak da 26 hastada (%24.3) ince barsak dışında lezyon saptandı.

Kesin nedenler:

gastrik ülser (n=3),
duodenal ülser (n=3),
Cameron lezyon (n=2),
GAVE (n=4),
radyasyon proktiti (n=1),
radyasyon ileiti (n=2),
duodenal anjiodisplazi (n=1),
hemoroid (yeni kanama belirtisi olan) (n=1),
kolon anjiodisplazisi (n=3),
kolon divertiküler hastalığı (n=3),
kolonik Crohn hastalığı (n=1),
anastomotik ülser (n=1).

Fry LC, et al. Aliment Pharmacol Ther 2009; 29(3):342-9

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kolon anjiodisplazisi (n=3),
kolon divertiküler hastalığı (n=3),
kolonik Crohn hastalığı (n=1),
anastomotik ülser (n=1).

CONCLUSIONS: The frequency of non-SB lesions definitely explaining the source of GIB in patients referred for DBE was 24.3%. Therefore, repeat esophago-gastroduodenoscopy (EGD) and ileocolonoscopy should be taken into consideration before DBE.

Fry LC, et al. Aliment Pharmacol Ther 2009; 29(3):342-9

DBE: Endikasyon ve Sonuçları

Endikasyon	DBE Bulguları	*n* (%)	Klinik yaklaşım
İnce barsak hastalığı şüphesi 24 (40)	Crohn hastalığı	5 (8)	Tıbbi ve endoskopik tedavi
	Jejunal kanser	2 (3)	Cerrahi tedavi
	Malign lenfoma	1 (1.7)	Tıbbi tedavi
	Enterolitiazis	1 (1.7)	Endoskopik tedavi
	Peutz-Jegher sendromu	1 (1.7)	Endoskopik tedavi
	İntestinal Behçet hastalığı	1 (1.7)	Tıbbi tedavi
	Cronkhite-Canada sendromu	1 (1.7)	Tıbbi tedavi
	Jejunal lipom	1 (1.7)	Tedavi yok
	NSAİİ bağlı ülser	1 (1.7)	Tıbbi tedavi
	Stomal ülser	1 (1.7)	Tıbbi tedavi
	Negatif sonuç	**9 (15)**	**Semptomatik yaklaşım**
"Obscure" GİS kanama			
Yetersiz kolonoskopi			
İleus öyküsü			

Akahoshi K, et al. World J Gastoenterol 2006;21:7654-59

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Endikasyon	DBE Bulguları	*n* (%)	Klinik yaklaşım
İnce barsak hastalığı şüphesi	**Negatif sonuç**	**9 (15)**	**Semptomatik yaklaşım**
	Pozitif sonuç	**15 (25)**	
"Obscure" GİS kanama 20 (33)	İleal anjiodisplazi	1 (1.7)	Endoskopik tedavi
	Jejunal kanser	1 (1.7)	Cerrahi tedavi
	NSAİİ bağlı ülser	1 (1.7)	Tıbbi teavi
	Peutz-Jegher polibi	1 (1.7)	Cerrahi tedavi
	İdiyopatik ince barsak ülseri	1 (1.7)	Tıbbi tedavi
	Negatif sonuç	**15 (25)**	**Klinik takip**
Yetersiz kolonoskopi			
İleus öyküsü			

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DBE: Endikasyon ve Sonuçları

Endikasyon	DBE Bulguları	*n* (%)	Klinik yaklaşım
İnce barsak hastalığı şüphesi	**Negatif sonuç**	**9 (15)**	**Semptomatik yaklaşım**
	Pozitif sonuç	**15 (25)**	
"Obscure" GİS kanama	**Negatif sonuç**	**15 (25)**	**Klinik takip**
	Pozitif sonuç	**5 (8)**	
Yetersiz kolonoskopi 14 (23)	Kolon polip	5 (8)	Endoskopik tedavi
	Kolon divertikül	3 (5)	Semptomatik tedavi
	Kolon kanseri	1 (1.7)	Cerrahi tedavi
	Kolon submukozal tümör	1 (1.7)	Takip
	Kolon tbc	1 (1.7)	Tıbbi tedavi
	Negatif sonuç	**3 (5)**	**Klinik takip**
İleus öyküsü			

Akahoshi K, et al. World J Gastoenterol 2006;21:7654-59

DBE: Endikasyon ve Sonuçları

Endikasyon	DBE Bulguları	*n* (%)	Klinik yaklaşım
İnce barsak hastalığı şüphesi	**Negatif sonuç**	**9 (15)**	**Semptomatik yaklaşım**
	Pozitif sonuç	**15 (25)**	
"Obscure" GİS kanama	**Negatif sonuç**	**15 (25)**	**Klinik takip**
	Pozitif sonuç	**5 (8)**	
Yetersiz kolonoskopi	**Negatif sonuç**	**3 (5)**	**Klinik takip**
	Pozitif sonuç	**11 (18)**	
İleus öyküsü 2 (3)	**Negatif sonuç**	**2 (3)**	**Klinik takip**
	Pozitif sonuç	**1 (2)**	

Akahoshi K, et al. World J Gastoenterol 2006;21:7654-59

DBE: Endikasyon ve Sonuçları

Endikasyon	DBE Bulguları	*n* (%)	Klinik yaklaşım
İnce barsak hastalığı şüphesi 24 (%40)	Negatif sonuç	9 (15)	**Semptomatik yaklaşım**
	Pozitif sonuç	15 (25)	
"Obscure" GİS kanama 20 (%33)	Negatif sonuç	15 (25)	**Klinik takip**
	Pozitif sonuç	5 (8)	
Yetersiz kolonoskopi 14 (%23)	Negatif sonuç	3 (5)	**Klinik takip**
	Pozitif sonuç	11 (18)	
İleus öyküsü 2 (%3)	Negatif sonuç	2 (3)	**Klinik takip**
	Pozitif sonuç	1 (2)	
Toplam 60 hasta (%100)	**Negatif sonuç**	**29 (49)**	
	Pozitif sonuç	**31 (51)**	

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DBE: İşlem ve Klinik Sonuçları

Endikasyonlar	Yaklaşım	*n*	Ortalama işlem zamanı (Ort. dk)	Başarı oranı
Panenteroskopi	Antegrade + Retrograde	**25**	122 (74-199)	**%40** (10/25)
Parsiyel enteroskopi	Antegrade	9	40 (11-99)	%67 (6/9)
	Retrograde	12	55 (10-87)	%75 (9/12)
	Toplam	**21**	46 (10-99)	**%71** (15/21)
Total kolonoskopi	Retrograde	14	47 (15-78)	%93 (13/14)

Akahoshi K, et al. World J Gastoenterol 2006;21:7654-59

DBE: Tedavi Sonuçları

	n	%
Endoskopik	9	15
Cerrahi	5	8
Tıbbi	12	20
Semptomatik yaklaşım veya takip	**34**	**56**

Akahoshi K, et al. World J Gastoenterol 2006;21:7654-59

DBE: Sonuç

DBE'nin tanısal değeri %43-83 olup*, işlem sonrası hastaların %57-84'ünde** tedavide değişikliğe neden olur…

* *Yamamoto H, Kita H. J Gastroenterol 2005;40:555–62. May A, et al. Gastrointest Endosc 2005;62:62–70. Yamamoto H, et al. Clin Gastroenterol Hepatol 2004;2:1010–6. May A, et al. Am J Gastroenterol 2007;102:527–35. Monkemuller K, et al. Endoscopy 2006;38:67–72. Mehdizadeh S, et al. Gastrointest Endosc 2006;64:740–750. Akahoshi K, et al. World J Gastroenterol 2006;12:7654–9. Di Caro S, et al. Gastrointest Endosc 2005;62:545–50. Heine GD, et al. Endoscopy 2006;38:42–8 Ell C, et al. Endoscopy 2005;37:613–6. Kaffes AJ, et al. Gastrointest Endosc 2006;63:81–6. Su MY, et al. Dig Dis Sci 2005;50:1041–5. Sun B, et al. Am J Gastroenterol 2006;101:2011–5. Zhong J, et al. Endoscopy 2007;39:208–15.*

** *May A, et al. Gastrointest Endosc 2005;62:62–70. Ell C, et al. Endoscopy 2005;37:613–6. Zhong J, et al. Endoscopy 2007;39:208–15. May A, et al. Endoscopy 2003;35:985–91. Monkemuller K, et al. Endoscopy 2006;38:67–72.*

META-ANALYSIS AND SYSTEMATIC REVIEWS *J Gastroenterol Hepatol 2011;26(5):796-801*

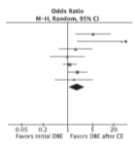
Double balloon enteroscopy and capsule endoscopy for obscure gastrointestinal bleeding: An updated meta-analysis

Christopher W Teshima,*,‡ Ernst J Kuipers,*,† Sander Veldhuyzen van Zanten‡ and Peter B F Mensink*

*Erasmus MC University Medical Center, Department of Gastroenterology and Hepatology, and †Internal Medicine, Rotterdam, the Netherlands; and ‡University of Alberta, Division of Gastroenterology, Edmonton, Canada

Study	n	Positive CE	Positive DBE	DBE yield after prior positive CE	DBE yield after prior negative CE
Matsumoto 2005	13	10 (76.9%)	6 (53.8%)	–	–
Hadithi 2006	35	28 (80%)	21 (60%)	20/28 (71.4%)	1/7 (14.3%)
Mehdizadeh 2006	115	63 (54.8%)	57 (49.6%)	41/63 (65.1%)	16/52 (30.8%)
Nakamura 2006	28	17 (60.7%)	12 (42.9%)	9/17 (52.9%)	3/11 (27.3%)
Fujimori 2007	45 (36*)	18 (40%)	18 (50%)	18/18 (100%)	2/20 (10%)
Ohmiya 2007	74	37 (50%)	39 (52.7%)	–	–
Kameda 2008	32	23 (71.9%)	21 (65.6%)	15/23 (65.2%)	2/3 (66.7%)
Arakawa 2009	74	40 (54.1%)	74 (63.5%)	36/40 (90%)	11/34 (32.4%)
Fukumoto 2009†	42	16 (38.1%)	16 (42.9%)	–	–
Marmo 2009	193	174 (90.2%)	132 (68.4%)	124/174 (71.3%)	8/19 (42.1%)

***Conclusions*: Capsule endoscopy and double balloon enteroscopy provide similar diagnostic yields in patients with OGIB. However, the diagnostic yield of DBE is significantly higher when performed in patients with a positive CE.**



Comparison of Magnetic Resonance and Balloon Enteroscopic Examination of the Small Intestine in Patients With Crohn's Disease

Conclusions
MREC is useful for detecting active lesions in the small intestine. However, **MR imaging is less sensitive** for detecting intestinal damage, such as stenoses. **Enteroscopy is preferred for identifying intestinal damage.** Suitable imaging approaches should be selected to assess CD lesions in deep small intestine.

Takenaka K, et al. Gastroenterology 2014:147(2);334-42

Comparison of Sensitivity and Diagnostic Accuracy of Capsule Endoscopy (CE), CT Enterography (CTE) and Double-Balloon Enteroscopy (DBE) for Detection of Small Bowel (SB) Lesions

***Conclusions:* DBE had a higher sens and diagnostic accuracy as compared to CE and CTE for all SB lesions and subtypes.** Due to our a priori definition of true positive findings, spec was 100% with DBE for all lesions. Sens was higher with CE compared to CTE for all SB, vascular and inflammatory lesions, but CTE had a higher sens for neoplastic lesions. DA was higher with CTE for all SB and neoplastic lesions, higher with CE for vascular lesions, and similar with both for inflammatory lesions. **Hence, CE and CTE have a complementary role in the diagnosis of SB lesions**, and are useful adjuncts in selection of patients for DBE.

Sens, spec and DA of CE, CTE and DBE

All SB lesions	Sens % (95% CI)	Spec % (95% CI)	DA % (95% CI)
CE	68 (52-84)	63 (46-77)	71 (54-76)
CTE	49 (33-64)	94 (81-98)	68 (60-81)
DBE	92 (83-100)	100	95 (91-99)
Vasc Lesions			
CE	80 (54-92)	100 (92-100)	96 (91-100)
CTE	53 (30-75)	97 (88-99)	88 (80-95)
DBE	93 (83-100)	100	98 (95-100)
Inflam Lesions			
CE	50 (27-53)	95 (86-98)	86 (78-94)
CTE	23 (9-49)	100 (99-100)	85 (76-93)
DBE	86 (67-100)	100	97 (94-100)
Neoplastic Lesions			
CE	50 (27-73)	87(75-93)]	79 (70-89)
CTE	57 (33-79)	97(88-99)	89 (82-96)
DBE	86 (67-100)	100	97 (94-100)

Shabana F. Pasha, et al. Gastrointestinal Endoscopy 2009 DDW Abstract AB 134

Enteroscopic and radiologic diagnoses, treatment, and prognoses of small-bowel tumors

Wataru Honda, MD,[1] Naoki Ohmiya, MD, PhD,[1] Yoshiki Hirooka, MD, PhD,[2] Masanao Nakamura, MD, PhD,[1] Ryoji Miyahara, MD, PhD,[1] Eizaburo Ohno, MD, PhD,[2] Hiroki Kawashima, MD, PhD,[1] Akihiro Itoh, MD, PhD,[1] Osamu Watanabe, MD, PhD,[1] Takafumi Ando, MD, PhD,[1] Hidemi Goto, MD, PhD[1]

Objective: To evaluate the usefulness of contrast-enhanced CT (CECT), fluoroscopic enteroclysis (FE), videocapsule endoscopy (VCE), and double-balloon endoscopy (DBE) and the outcome after treatment.
Design: Single-center, retrospective study.
Patients: 159 consecutive patients with SBTs (93 malignant and 66 benign) were enrolled.
Main Outcome Measurements: Comparison of diagnostic yields among CECT, FE, VCE, and DBE and the prognosis.
Results: CECT and FE had significantly lower diagnostic yields of SBTs 10 mm, but VCE and DBE had high yields of SBTs regardless of size. CECT had a significantly lower diagnostic yield of epithelial tumors compared with subepithelial tumors. When stratified by the site, the diagnostic yield of VCE for SBTs located only in the distal duodenum/the proximal jejunum (73%) was significantly lower than that for SBTs located in other areas (90%). Comparisons among the 4 methods revealed that VCE and DBE had significantly higher diagnostic yields than CECT, and DBE had significantly higher diagnostic yields than VCE, but a combination of CECT and VCE had a diagnostic yield similar to that of DBE. The histologic diagnostic yield of SBTs by DBE was 92%, and 25% of SBTs were enteroscopically treated. Metastatic tumors had the poorest overall survival, followed by adenocarcinomas and malignant lymphomas.
Conclusion: For the detection of SBTs, a combination screening method by using VCE and CECT is recommended. DBE is useful for histologic diagnosis and endoscopic treatment.

Gastrointest Endosc 2012;76:344-54

Enteroscopic and radiologic diagnoses, treatment, and prognoses of small-bowel tumors

Wataru Honda, MD,[1] Naoki Ohmiya, MD, PhD,[1] Yoshiki Hirooka, MD, PhD,[2] Masanao Nakamura, MD, PhD,[1] Ryoji Miyahara, MD, PhD,[1] Eizaburo Ohno, MD, PhD,[2] Hiroki Kawashima, MD, PhD,[1] Akihiro Itoh, MD, PhD,[1] Osamu Watanabe, MD, PhD,[1] Takafumi Ando, MD, PhD,[1] Hidemi Goto, MD, PhD[1]

TABLE 6. Diagnostic yields of tumors or polyps (%)

Size	Origin	CECT*	FE*	VCE†	DBE‡
≤10 mm	Epithelial	0/9 (0)	0/2 (0)	6/8 (75)	19/19 (100)
	Subepithelial	5/21 (24)	4/8 (50)	24/29 (83)	32/33 (97)
>10 mm	Epithelial	18/31 (58)§	29/30 (97)	29/32 (91)	41/42 (98)
	Subepithelial	55/60 (92)	38/40 (95)	25/32 (78)	60/64 (94)

CECT, Contrast-enhanced abdominal CT; *FE*, fluoroscopic enteroclysis; *VCE*, videocapsule endoscopy; *DBE*, double-balloon endoscopy or enteroscopy.
*$P < .0001$, tumors ≤10 mm compared with >10 mm.
†$P = .8784$, tumors ≤10 mm compared with >10 mm.
‡$P = .9214$, tumors ≤10 mm compared with >10 mm.
§$P = .0003$, epithelial tumors >10 mm compared with subepithelial tumors >10 mm.

Gastrointest Endosc 2012;76:344-54

TABLE 7B. Comparison of diagnostic yields of DBE and CECT*†

	DBE		
	Positive	Negative	Total
CECT			
Positive	76	3	79
Negative	42	1	43
Total	118	4	122

DBE, Double-balloon endoscopy or enteroscopy; *CECT*, contrast-enhanced abdominal CT.
*$P = .00000001$, odds ratio 14.00, exact McNemar test.
†The diagnostic yield of DBE (97%) was significantly higher than that of CECT (65%).

TABLE 7C. Comparison of diagnostic yields of DBE and VCE*†

	DBE		
	Positive	Negative	Total
VCE			
Positive	81	1	82
Negative	17	2	19
Total	98	3	101

DBE, Double-balloon endoscopy or enteroscopy; *VCE*, videocapsule endoscopy.
*$P = .0004$, odds ratio 17.00, exact McNemar test.
†The diagnostic yield of DBE (97%) was significantly higher than that of VCE (81%).

TABLE 7D. Comparison of diagnostic yields of DBE and a combination test (CECT and VCE)*†

	DBE		
	Positive	Negative	Total
CECT + VCE			
Positive	66	1	67
Negative	7	0	7
Total	73	1	74

DBE, Double-balloon endoscopy or enteroscopy; *CECT*, contrast-enhanced abdominal CT; *VCE*, videocapsule endoscopy.
*$P = .0771$, odds ratio 7.00, exact McNemar test.
†The diagnostic yield of both CECT and VCE (91%) was not significantly different from that of DBE (99%).

Enteroscopic and radiologic diagnoses, treatment, and prognoses of small-bowel tumors

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Objective: To evaluate the usefulness of contrast-enhanced CT (CECT), fluoroscopic enteroclysis (FE), videocapsule endos… (VCE), and double-balloon enteroscopy (DBE) and the outcomes after treatment.

Desig…

Patie…

Main…

Resu…

SBTs …

tumors …

jejunu…

the …

diag…

yiel…

that …

were …

by a…

Con…

DBE, VCE > CECT, FE

DBE > VCE

CECT + VCE = DBE

CECT is recommended. DBE is useful for histologic diagnosis and endoscopic treatment.

Gastrointest Endosc 2012;76:344-54

Prachayakul et al. BMC Gastroenterology 2013, 13:103
http://www.biomedcentral.com/1471-230X/13/103

BMC Gastroenterology

RESEARCH ARTICLE Open Access

The utility of single-balloon enteroscopy for the diagnosis and management of small bowel disorders according to their clinical manifestations: a retrospective review

Varayu Prachayakul[1,2*], Morakot Deesomsak[1], Pitulak Aswakul[3] and Somchai Leelakusolvong[1,2]

Indication / Details	Overt GI bleeding (n = 84) n (%)	Occult GI bleeding (n = 21) n (%)	Abdominal pain (n = 14) n (%)	Chronic diarrhea (n = 18) n (%)	Abnormalities on imaging scans (n = 8) n (%)
Age (years)	61.8 ± 18.0	81.0 ± 18.3	50.4 ± 12.7	47.5 ± 14.5	55.7 ± 15.5
Sex: male	51 (60.7)	6 (28.6)	9 (64.5)	5 (27.8)	4 (50.0)
Route: antegrade	60 (71.4)	18 (85.7)	11 (78.6)	16 (88.9)	7 (87.5)
Areas of interest achieved	61 (72.6)	20.0 (95.2)	11 (78.6)	18 (100)	7 (87.5)
Findings					
Negative	37 (44.0)	7 (33.3)	3 (21.4)	6 (33.3)	5 (62.5)
Positive	48 (56.0)	14 (66.7)	11 (78.6)	12 (66.7)	3 (37.5)
Erosions	13 (15.5)	3 (14.3)	11 (78.6)	3 (16.7)	1 (12.5)
Ulcers	14 (16.7)	3 (14.3)	6 (42.9)	3 (16.7)	0 (0.0)
Stricture	0 (0.0)	2 (9.5)	4 (28.6)	0 (0.0)	0 (0.0)
Angiodysplasia	4 (4.8)	1 (4.8)	0 (0.0)	0 (0.0)	0 (0.0)
Polyp	1 (1.2)	4 (19.0)	0 (0.0)	3 (16.7)	0 (0.0)
Mass	8 (9.5)	2 (9.5)	1 (7.1)	0 (0.0)	1 (12.5)

Prachayakul et al. BMC Gastroenterology 2013, 13:103
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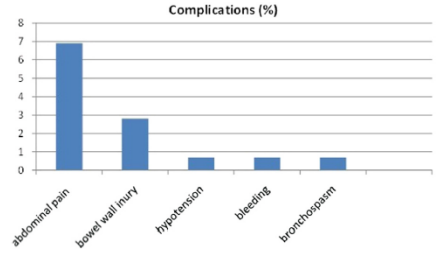

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Indication / Details	Overt GI bleeding (n = 84) n (%)	Occult GI bleeding (n = 21) n (%)	Abdominal pain (n = 14) n (%)	Chronic diarrhea (n = 18) n (%)	Abnormalities on imaging scans (n = 8) n (%)
Failure	7 (8.3)	0 (0.0)	0 (0.0)	0 (0.0)	1 (12.5)
Therapeutic interventions performed	11 (13.1)	5 (23.8)	0 (0.0)	0 (0.0)	0 (0.0)
Clinical conclusion	37 (44.0)	7 (33.3)	3 (21.4)	6 (33.3)	5 (62.5)
Negative finding					
Incidental finding	11 (13.1)	3 (14.3)	3 (21.4)	3 (16.7)	1 (12.5)
Associated positive finding	11 (13.1)	1 (4.8)	4 (28.6)	5 (27.8)	1 (12.5)
Definitive diagnosis	25 (29.8)	10 (47.6)	7 (50.0)	4 (22.2)	1 (12.5)
Diagnostic yield	36 (42.9)	11 (52.4)	13 (78.6)	8 (50.0)	2 (25.0)
Clinical success	35 (41.7)	11 (52.4)	10 (71.4)	7 (38.9)	3 (37.5)
Minor complications	9 (10.5)	3 (14.3)	1 (7.1)	0 (0.0)	2 (25.0)
Time to enteroscopy (days)	49.3	N/A	N/A	N/A	N/A
VCE done	51 (60.7)	11 (52.4)	2 (14.3)	3 (16.7)	0 (0.0)

Single- vs. double-balloon enteroscopy in small-bowel diagnostics: a randomized multicenter trial

	DBE (n = 65)	SBE (n = 65)	P value
Age, mean (range), years	52 (18–84)	53 (21–80)	0.74
Males/females	32/33	35/30	0.73
Previous abdominal surgery, n (%)	16 (25)	16 (25)	1.00
Indication for enteroscopy, n (%)			
Occult/overt gastrointestinal bleeding	29 (45)	26 (40)	0.72
Crohn's disease	11 (17)	12 (18)	0.81
Abdominal pain	9 (14)	9 (14)	1.00
Diarrhea	7 (11)	6 (9)	0.77
Polyposis syndromes	2 (3)	3 (5)	0.65
Other	7 (11)	9 (14)	0.78

	Mean (SD) VAS, mm		P value
	DBE (n = 65)	SBE (n = 65)	
Pain during examination	33.0 (26)	36.2 (33.6)	0.55
Pain after 1 hour	12.2 (21.9)	12.5 (24.2)	0.87
Pain after 3 hours	3.9 (11.1)	3.6 (12.0)	0.57
Pain after 6 hours	2.3 (5.2)	3.1 (8.6)	0.82
Pain after 24 hours	2.4 (5.5)	3.8 (9.0)	0.41

Competing interests: None

Domagk D, et al. Endoscopy 2011; 43(6): 472-476

472 Original article

Single- vs. double-balloon enteroscopy in small-bowel diagnostics: a randomized multicenter trial

	DBE (n = 65)	SBE (n = 65)	P value
Approach, n (%)			
Oral only	11 (17)	15 (23)	0.51
Combined oral and anal	54 (83)	50 (77)	
Insertion depth (range), cm			
Oral approach	253 (120–450)	258 (100–560)	
Anal approach	107 (10–250)	118 (5–300)	
Combined approach (n = 53)	360 (180–550)	373 (100–620)	
Complete small-bowel visualization, n (%)	12 (18)	7 (11)	
Oral only	1	1	
Combined oral and anal	11	6	
Procedure duration, mean (range), minutes	105 (40–140)	96 (35–135)	0.13
Primary diagnosis achieved, n (%)	28 (43)	24 (37)	0.59
Angiodysplasia	7 (11)	3 (5)	
Crohn's disease activity	7 (11)	4 (6)	
Polyposis	3 (5)	3 (5)	
Other	11 (17)	14 (22)	
Therapeutic procedures, n (%)	6 (9)	3 (5)	0.49

Domagk D, et al. Endoscopy 2011; 43(6): 472-476

Prospective Multicenter Trial Comparing Push-and-Pull Enteroscopy With the Single- and Double-Balloon Techniques in Patients With Small-Bowel Disorders

Am J Gastroenterol 2010; 105:575–581;

Andrea May, MD, PhD[1], Michael Färber, MD[1], Insa Aschmoneit, MD[1], Jürgen Pohl, MD, PhD[1], Hendrik Manner, MD[1], Erich Lotterer, MD, PhD[1], Oliver Mönchler, MD[1], Johannes Kunz, MD[1], Liebwin Gossner, MD, PhD[1], Klaus Mönkemüller, MD, PhD[2] and Christian Ell, MD, PhD[1]

WHAT IS CURRENT KNOWLEDGE

- ✓ Double-balloon enteroscopy (DBE) has become the standard investigation technique for deep small-bowel endoscopy in patients with known or suspected small-bowel disorders.
- ✓ Single-balloon enteroscopy (SBE) is a simplification of this balloon enteroscopy technique and is said to be easier and faster with the same results, e.g., regarding insertion depth.

WHAT IS NEW HERE

- ✓ We carried out a prospective comparison of the single- and double-balloon techniques.
- ✓ Preparation time of the SBE is significantly faster than that of the DBE.
- ✓ Rate of complete enteroscopy is threefold higher using the DBE technique compared with the SBE technique.

Double-vs.Single-Balloon vs. Spiral Enteroscopy

Starting with the introduction of the double-balloon enteroscope in 2001, two more techniques have been successfully developed for small bowel investigation (single-balloon enteroscopy, spiral enteroscopy). To compare the different enteroscopy systems, within this review, **68 studies** were analyzed and put into context. The procedural characteristics (mean insertion depth, diagnostic yields, adverse events) were comparable for DBE, SBE or SE. The higher panenteroscopy rate in DBE might not have any clinical relevance. Therapeutic procedures, such as argon-plasma coagulation, polypectomy, dilation therapy and foreign body extraction are described with the DBE and SBE procedure. **With regard to the present literature, the balloon-assisted devices as well as spiral enteroscopy technique seem to be equally suitable in clinical routine for imaging of the small bowel. The choice of the method should be based on availability, physicians' experience and clinical implications.** Future randomized, controlled trials with large numbers of patients are needed to work out the subtleties of every single method.

Lenz P, Domagk D. Best Pract Res Clin Gastroenterol 2012;26(3):303-13

Is Small-Bowel Radiography Necessary Before Double-Balloon Endoscopy?

Diagnosis	Abnormal Radiographic Findings (n = 45)	Normal Radiographic Findings (n = 31)	No Radiography (n = 48)	Total
Localized tumor[a]	6	2	2	10
Polyposis[b]	8	2	2	12
Vascular lesion[c]	1	3	12	16
Inflammatory disease[d]	21	4	5	30
Miscellaneous condition[e]	2	2	1	5

a Malignant lymphoma, metastatic tumor, gastrointestinal stromal tumor, cancer, lipoma, unclassified polyp.
b Familial adenomatous polyposis, multiple lymphomatous polyposis, Peutz-Jeghers syndrome, multiple endocrine tumors.
c Angiodysplasia, portal hypertensive enteropathy.
d Crohn's disease, nonsteroidal antiinflammatory drug–induced enteropathy, chronic nonspecific multiple ulcers of small intestine, intestinal tuberculosis, intestinal involvement of Behçet's syndrome, ischemic jejunitis, other inflammatory condition.
e Amyloidosis, lymphangiectasia, Meckel's diverticulum, remaining push-through package.

Is Small-Bowel Radiography Necessary Before Double-Balloon Endoscopy?

TABLE 3: Comparison of Positive Diagnostic Yield of Double-Balloon Endoscopy Among Indications

Indication	Abnormal Radiographic Findings		Normal Radiographic Findings		No Radiography		Total	
	No.	Positive Rate (%)	No.	Positive Rate (%)	No.	Positive Rate (%)	No.	Positive Rate (%)
Obscure bleeding	4	100	14	35.7	31	51.6	48	52.1
Polyposis	9	77.7	3	66.7	7	28.6	19	57.9
Other symptoms	32	65.6	14	28.6	10	40	56	51.8
Total	45	71.1[a,b]	31	35.5[a,c]	48	45.8[b,c]	124	52.4

[a]Positive rate significantly different among the three groups ($p = 0.0002$).
[b]Positive rate significantly different between two groups ($p = 0.002$).
[c]Positive rate significantly different between two groups ($p = 0.014$).

Matsumoto T, et al. AJR 2008

Total Enteroskopi Oranı

86/108: %80

- Başarıyı etkileyen en önemli etken geçirilen abdominal cerrahi işlemler (örn.laparoskopi gibi…)

Endoskopik bulgular (238 hasta)

- İ.barsak ülser ve/veya erezyon : 102
  - Crohn, NSAİİ, Behçet, tuberküloz, Meckel divertikülü, kör loop sendromu, diğer küçük intestinal ülserler
- İntestinal polip ve/veya tümör :75
- İntestinal vasküler lezyonlar : 54

Hironori Yamamoto, 2006

"Obscure" GİS Kanama

- Kanama odağının belirlenmesi:

141/188: %75

- Küçük intestinal ülser ve/veya erezyon : 63
- Küçük intestinal vasküler lezyonlar : 44
- Küçük intestinal polip ve/veya tümör : 24

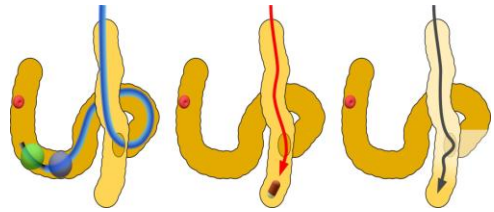
- Endoskopik hemostaz : 57/84
  - Koagulasyon:45/ 69
  - Hemoklip: 12/17
- Polipektomi ve EMR : 17/ 44
- Balon dilatasyonu (darlık için) : 45/87
- Stent yerleştirme : 6/7
- Yabancı cisim çıkarma : 5 /5

Hironori Yamamoto, 2006

Konuşmanın Başlıkları

1. Enteroskopi çeşitleri
2. Endikasyonlar, komplikasyonlar ve kontrendikasyonlar
3. Enteroskopide en sık rastlanan lezyonlar
4. Klinik uygulamalar
5. İnce barsak dışı kullanımı
6. Kocaeli Üniversitesi deneyimi

Afferent Loop ve DBE

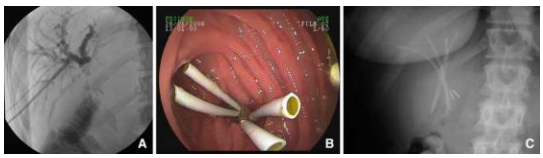


Seçilecek alet	DBE	Kapsül endoskop	Kontrast flim
Afferent loop	+	--	--

Roux en Y Hepatiko-Jejunostomili Hastalarda ERCP

- 14 hasta
- 13 hastada işlem başarılı (7E, 6K)(28-61 yaş arası)
- Toplam 20 ERCP işlemi
- 1 hasta anastomotik darlık nedeniyle yapılamadı
- Ortalama 75±62 dk

Ampullaya ulaşma ve tedavide başarı %92.9



Parlak E, et al. Surg Endosc 2010;24:466-70

Roux en Y Hepatiko-Jejunostomili Hastalarda ERCP

Parlak E, et al. Surg Endosc 2010;24:466-70

No.	Gender	Age (years)	Indication of operation	Presentation	Procedure
1	F	53	LC injury	Broken percutaneous catheter	Extraction of catheter, ERC
2	F	43	LC injury	1. Cholangitis	1. ERC, stent insertion
				2. Stent change	2. ERC, stent extraction
3	M	51	LC injury	1. Cholangitis	1. ERC, stent insertion
				2. Stent exchange	2. ERC, stent insertion
4	M	55	Left hemi-hepatectomy for CCA	Anastomotic stenosis on percutaneous cholangiogram	ERC
5	M	61	LC injury	1. Cholangitis	1. ERC, stent insertion
				2. Stent exchange	2. ERC, stent extraction
6	M	47	OLT	Jaundice	ERC
7	M	48	OLT	Jaundice	ERC
8	F	37	LC injury	1. Cholangitis	1. ERC, stent insertion
				2. Stent exchange	2. Stricturoplasty with needle knife stent insertion
				3. Stent exchange	3. Stent extraction
9	F	28	LC injury	1. Cholangitis	1. Stent insertion
				2. Stent exchange	2. Stent insertion
				3. Stent exchange	3. ERC, stent extraction, balloon dilatation
10	M	53	LC injury	Itching	ERC
11	F	49	LC injury	Cholangitis	ERC, stent insertion
12	F	32	LC injury	Cholangitis	ERC, stent insertion
13	F	32	LC injury	Cholangitis	ERC
14	F	58	LC injury	Cholangitis	Anastomosis could not be reached

Roux en Y Hepatiko-Jejunostomili Hastalarda ERCP

Table 2 Series of DBE-ERC in Roux-en-Y anastomosis*

Author, year	Ref.	Number of cases total (papilla/HJ)	Ratio to reach anastomosis/papilla	Cannulation (papilla/HJ)	Duration (min)	Major complication (n)
Mehdizadeh, 2006	[7]	6 (3/3)	5/6	0/3, 2/3	NR**	0
Aabaken, 2007	[8]	18 (1/17)	17/18	0/1, 15/16	40 (5–120)***	0
Emmet, 2007	[9]	14 (6/8)	13/14	4/5, 8/8	99 ± 48	0
Maaser, 2008	[10]	9 (2/7)	8/9	2/2, 4/6	NR	0
Koornstra, 2008	[11]	3 (0/3)	3/3	3/3	NR	1, bacteremia
Monkemuller, 2008	[12]	2 (1/1)	2/2	1/1, 1/1	NR	0
Our series		14 (0/14)	13/14	13/13	75 ± 62	1, perforation

* Patients who do not have Roux-en-Y anastomosis were not included in the list
** Not reported
*** Duration to reach anastomosis

Konuşmanın Başlıkları

1. Enteroskopi çeşitleri
2. Endikasyonlar, komplikasyonlar ve kontrendikasyonlar
3. Enteroskopide en sık rastlanan lezyonlar
4. Klinik uygulamalar
5. İnce barsak dışı kullanımı
6. Kocaeli Üniversitesi deneyimi

KOCAELİ ÜNİVERSİTESİ GASTROENTEROLOJİ

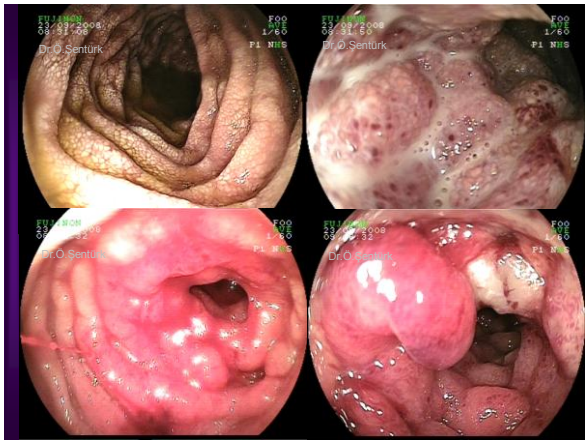
Aralık 2006- Eylül 2014

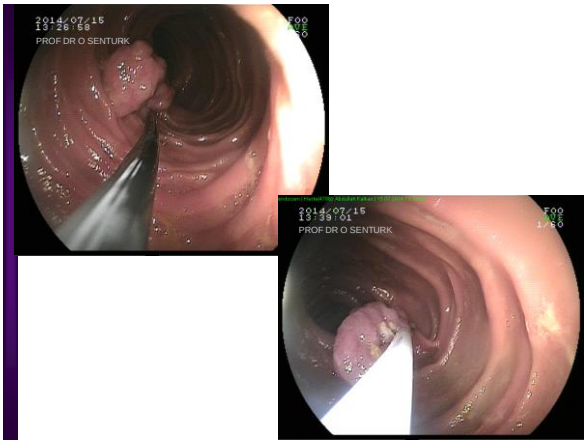
- 355 hasta (186 E/ 169 K), yaş ortalaması 46 (18-78 yıl)
- 388 DBE işlemi
  - 137 anal,
  - 175 oral,
  - 86 anal + oral yol
- Tanı oranı %61.7
- Oral yoldan yapılan enteroskopilerde ortalama işlem süresi 63,3 dk, pilordan sonra ortalama ilerleme mesafesi 300 cm

KOCAELİ ÜNİVERSİTESİ GASTROENTEROLOJİ

Aralık 2006- Eylül 2014

- Patolojik bulgular;
  - Anjiodisplazi (44)
  - Non-spesifik jejunoileit (32)
  - Crohn Hastalığı (19)
  - Gluten Enteropatisi (17)
  - Erozif jejuno-ileit (16)
  - Tümör (9)
  - Non-spesifik jejunoileal ülser (8)
  - Benign fibrotik striktür (6)
  - Obstrüksiyon (3)
  - Meckel divertikülü (2)
  - İleumda polip (2)
- 11 hastada ince barsak dışı patolojisi





KOCAELİ ÜNİVERSİTESİ GASTROENTEROLOJİ
Aralık 2006- Eylül 2014

- Anal yoldan yapılan enteroskopilerde ortalama işlem süresi 71,4 dk, ileoçekal valften sonra ortalama ilerleme mesafesi 200 cm
- 63 hastaya terapötik işlem
  - injeksiyon ve/veya koagülasyon
  - polipektomi
  - dilatasyon
- İşlem sonrası karın ağrısı olan ve klinik takibi yapılan 10 hastada hafif amilaz yüksekliği (üst sınırın 2 katını geçmeyen) tespit edilmesine karşın hiçbir hastada pankreatit gelişmedi
- İki hastada perforasyon! (işaretlemede kullanılan boyaya bağlı, aynı günde yapılan 2 hasta)

DBE ve Sorunlar

- İşlemin süresi ortalama 1-2 saat
  - Oral veya anal bulgu yoksa ikinci işlem
- Sedasyon -genel anestezi & propofol & midozolam
  - Potansiyel kardiyo-pulmoner risk
- Kontrol edilecek bölgenin belirsizliği
  - Nereye kadar kontrol
- Komplikasyonlar
  - Pankreatit ve hiperamilazemi
  - Paralitik ileus, epinefrin sonrası iskemi – nekroz
  - Polipektomi sonrası kanama, perforasyon

Sonuç

- Oral ve anal DBE ile tüm GİS'in direkt olarak incelenmesi mümkündür
- DBE ile tanı yanında tedavi işlemleri de başarılı bir şekilde uygulanabilir
- DBE kulanımında yeni endikasyonlar ortaya çıkmaktadır
- Özellikle GİS kanalda anatomik değişikliği olan karaciğer-safra yolları ve pankreas hastalıklarının tanı ve tedavisinde önemi giderek artmaktadır