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Endotherapie von benignen Stenosen im Gastro-intestinaltrakt – Bougie, Ballon und/oder Stent

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Benigne Stenosen

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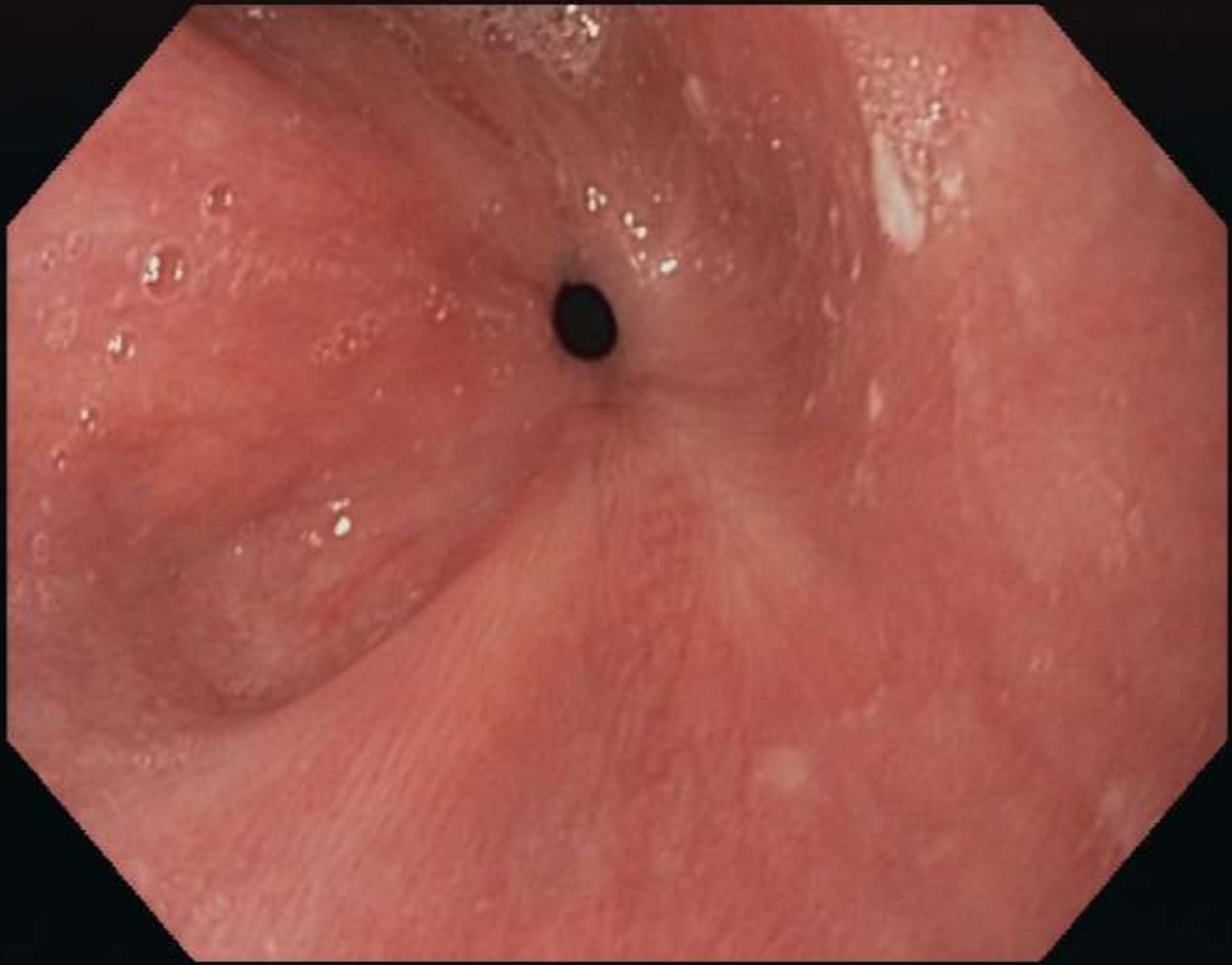
- Ösophagus
- Pylorus
- Duodenum/Dünndarm
- Kolon, Rektum
- Gallenwege
- Pankreasgang
- Anastomosen
- …….

- Entzündlich
    - Reflux
    - EoE
    - M. Crohn
- Radiogen
- Narbig
    - Postoperativ
    - Postentzündlich
    - Postinterventionell
- Angeboren
- …..



Benigne Stenosen: Therapie

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Table 1 Endoscopic options of esophageal stricture management

Dilatation
Balloon
Bougie
Dilatation with injection therapy
Intralesional triamcinolone
Topical mitomycin C
Incisional therapy
Stent placement
SEMS
SEPS
Biodegradable stents
Rendezvous procedure

SEMS: Self expanding metal stents; SEPS: Self expanding plastic stents.

Samanta et al. WJ GE 2015

Bougie vs. Ballon

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	Bougie	Ballon
Gefühl	+	-
Sicht	-	+
Max. Weite	15-16 mm	20 mm
Effektivität	+	+
Kosten	gering	hoch

Ösophagus: EoE

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	Balloon (n = 395)	Savary (n = 91)	p
Max eosinophil count (mean eos/hpf ± SD)	55.8 ± 53.5	58.7 ± 72.2	0.73
On meds at dilation, n (%)	162 (42)	29 (34)	0.19
On diet at dilation, n (%)	60 (16)	13 (18)	0.90
Esoph diameter (mm) before dil (mean ± SD)	12.5 ± 2.9	12.7 ± 3.6	0.55
Esoph diameter (mm) after dil (mean ± SD)	15.3 ± 2.9	14.5 ± 2.7	0.02
Increase in esoph diameter (mean mm ± SD)	2.8 ± 1.2	1.8 ± 1.5	<0.001
Symptom response, n (%)*	106 (87)	24 (77)	0.34
Complications, n (%)‡			
Any complication	16 (4)	9 (10)	0.10
Pain	16 (4)	5 (6)	0.53
Bleeding	0	0	N/A
ER visit	1 (0.3)	4 (4)	0.005
Hospitalization	1 (0.3)	1 (1.1)	0.34
Perforation	0	0	N/A
Death	0	0	N/A

Runge et al. Am J Gastro 2016

Ösophagus: Anastomosenstenose

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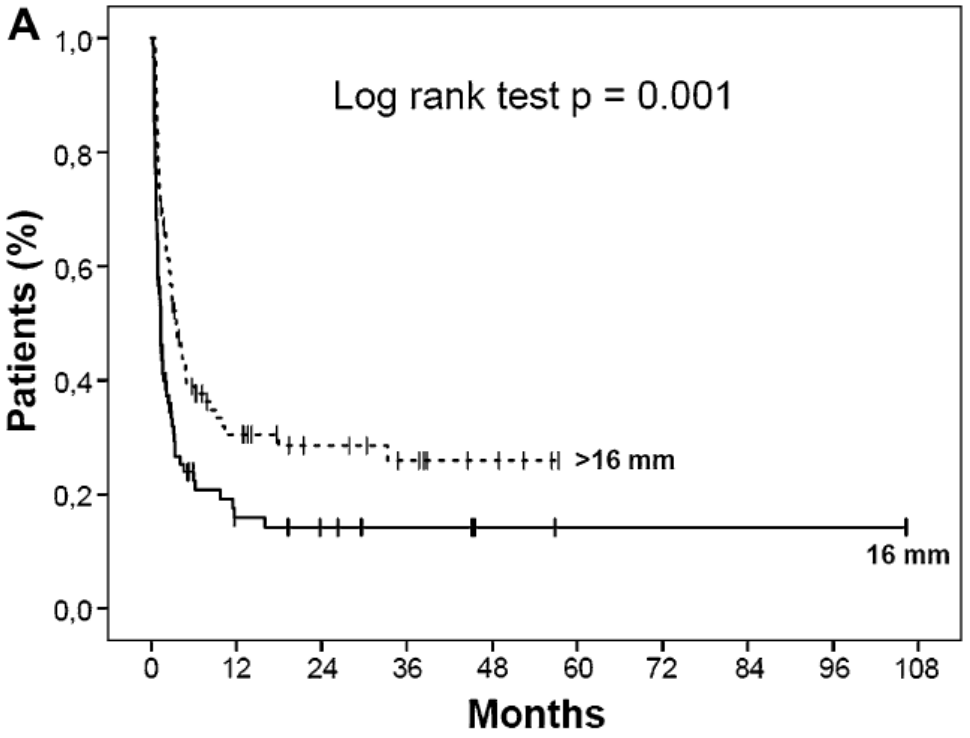
	16 mm N = 88	>16 mm N = 91	p
Gender			0.606
Male	64 (72.7)	63 (69.2)	
Female	24 (27.3)	28 (30.8)	
Age (years); mean ± SD	64.3 ± 8.2	63.3 ± 10.6	0.487
Esophageal replacement			0.240
Gastric tube reconstruction	86 (97.7)	91 (100)	
Colonic interposition	2 (2.3)	0 (0)	
Location of esophageal anastomosis			0.182
Cervical	77 (87.5)	86 (94.5)	
Intrathoracic	10 (11.4)	5 (5.5)	
Missing	1 (1.1)	0 (0)	
Esophageal anastomosis			0.193
Hand-sewn	60 (68.2)	58 (63.7)	
Stapled	12 (13.6)	5 (5.5)	
Missing	16 (18.2)	28 (30.8)	
Esophageal anastomosis[a]			**0.024**
End-to-end	40 (45.5)	53 (58.2)	
End-to-side	37 (42.0)	23 (25.3)	
Missing	11 (12.5)	15 (16.5)	
Postsurgical esophageal leakage			0.083
Yes	18 (20.5)	29 (31.9)	
No	70 (79.5)	62 (68.1)	
Stent for postsurgical leakage			1.000
Yes	1 (1.1)	1 (1.1)	
No	87 (98.9)	90 (98.9)	
Days between surgery and first dilation; median (range)	66 (31–399)	77 (28–680)	0.255
Stricture diameter (mm); mean ± SD	9.8 ± 1.9	9.5 ± 1.9	0.305
Esophageal segment			**0.013**
Proximal (<25 cm from incisors)	74 (84.1)	87 (95.6)	
Mid (25–30 cm from incisors)	14 (15.9)	4 (4.4)	
Distal (>30 cm from incisors)	0 (0)	0 (0)	
Method of endoscopic dilation			1.000
Bougie	85 (96.6)	87 (95.6)	
Balloon	0 (0)	1 (1.1)	
Combination	3 (3.4)	3 (3.3)	
Kenacort injected during dilation[b]			**0.001**
Yes	9 (10.2)	0 (0)	
No	79 (89.8)	91 (100)	



van Halsema et al. Surg Endosc 2017

Dilatationskappe

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Stents

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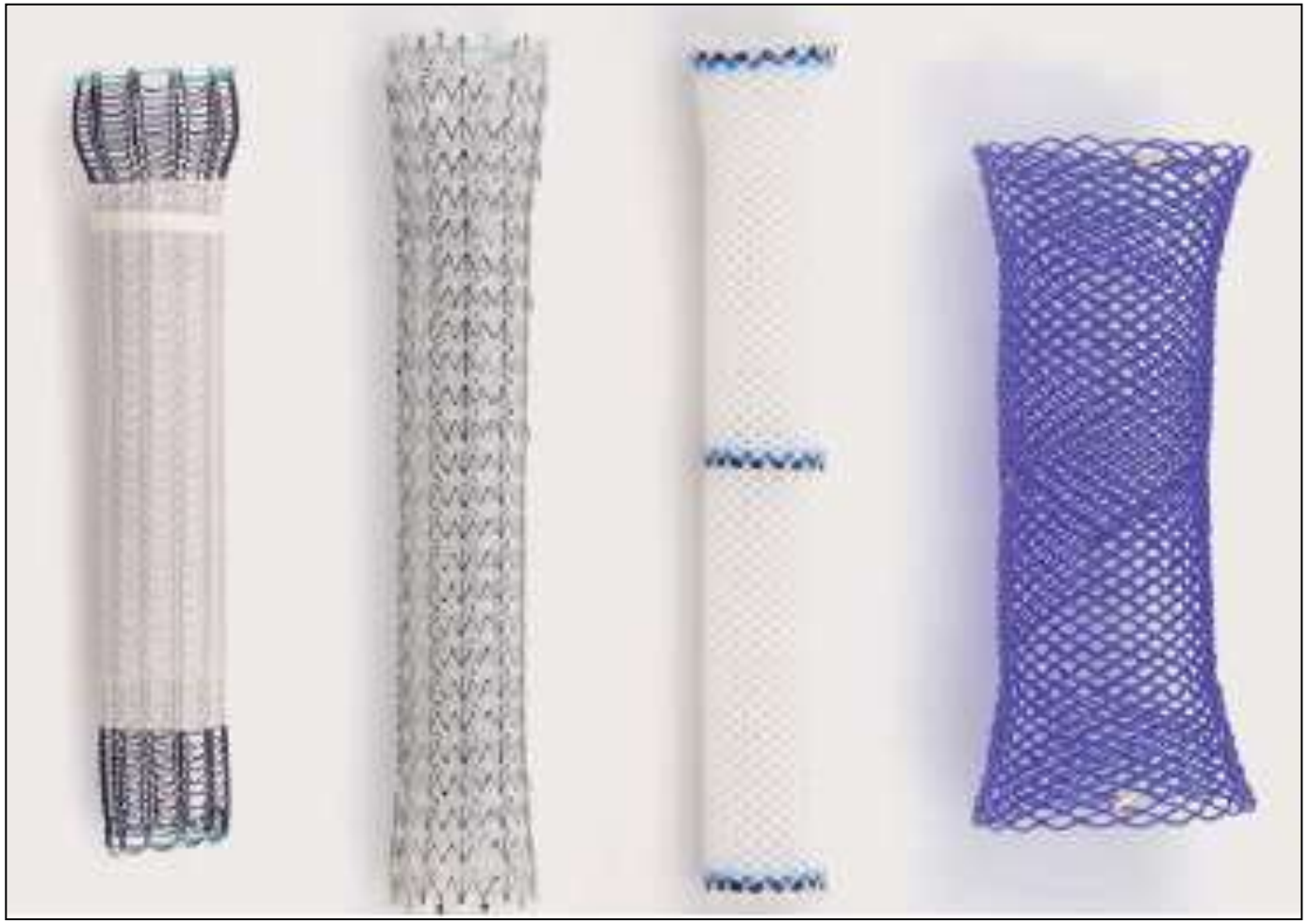
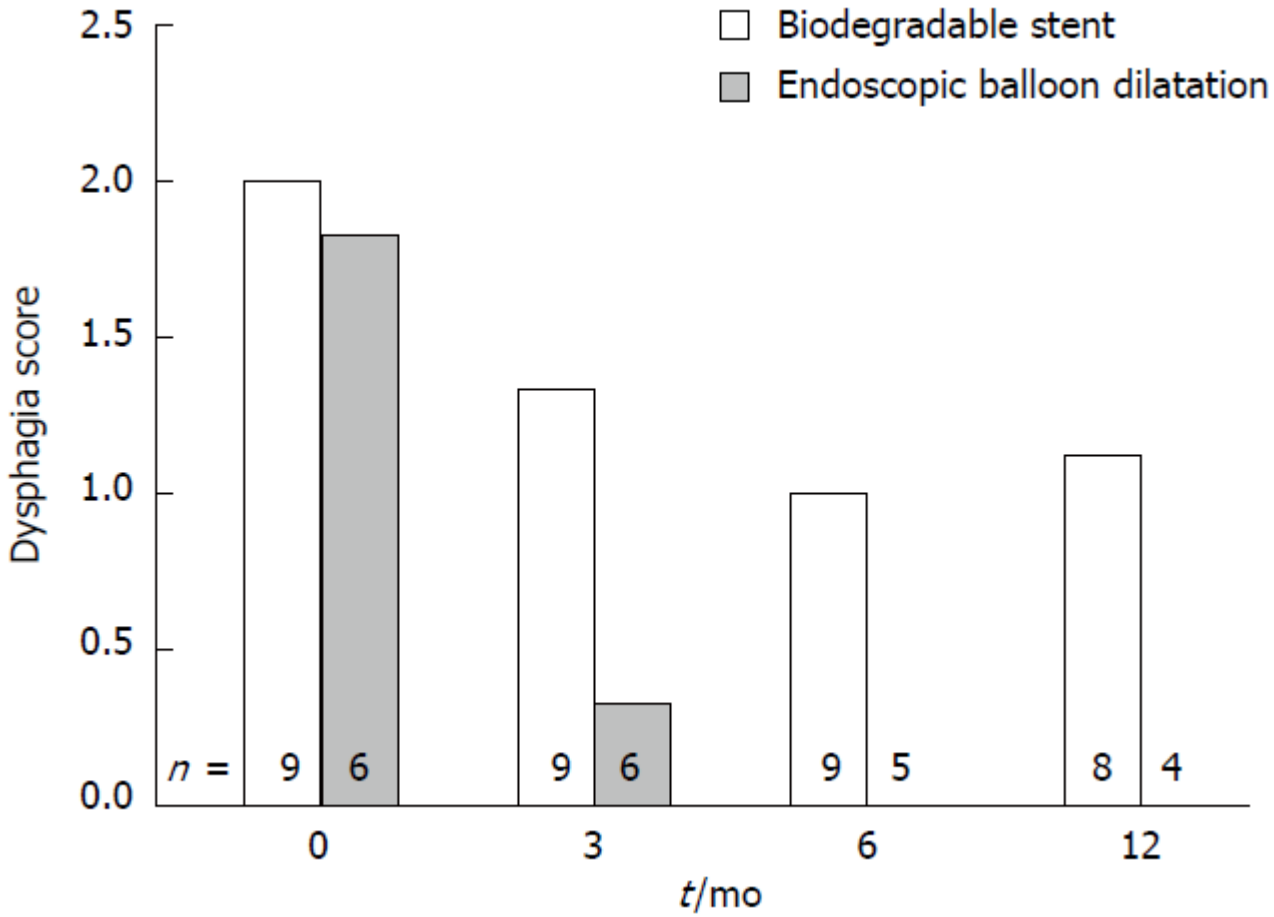


Ösophagus: Stent vs. Ballon



Dhar et al. WJG 2014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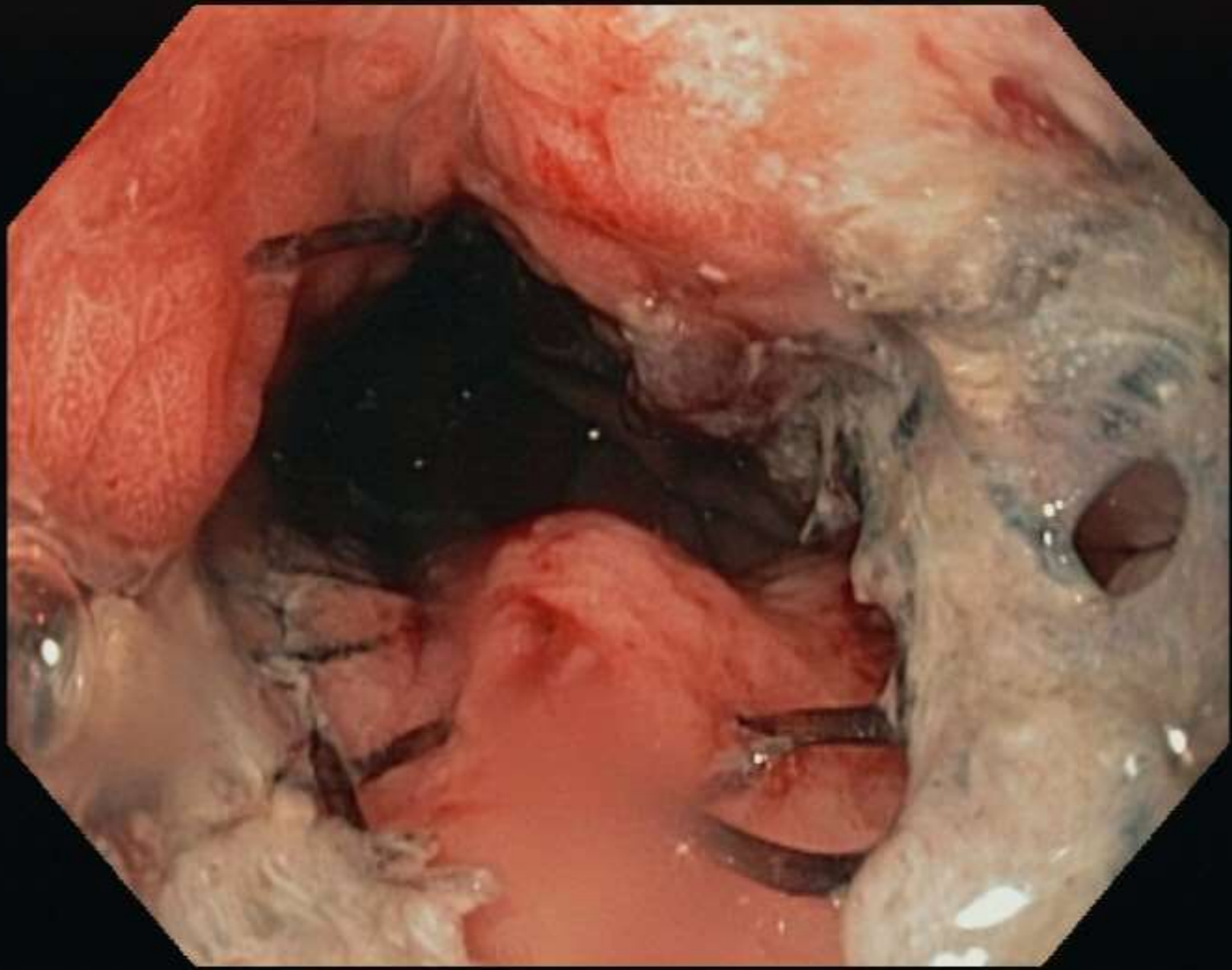

Ösophagus: Stent

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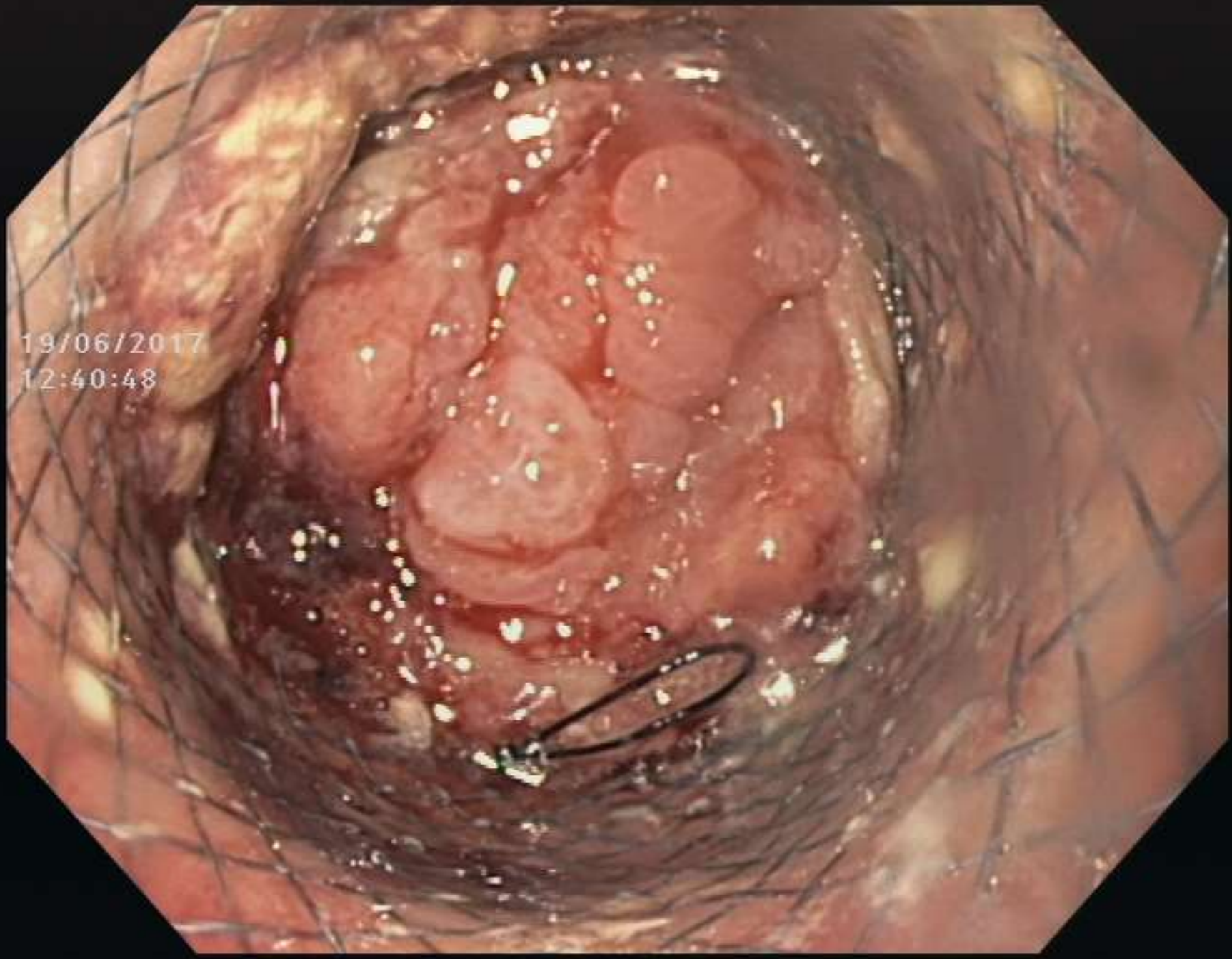
Table 2 Pooled analysis of 232 patients with refractory benign esophageal strictures according to Kochman's criteria treated with self-expandable stent placement *n* (%)

Stricture etiology	
Anastomotic strictures	69 (29.7)
Peptic strictures	58 (25.0)
Radiation strictures	36 (15.5)
Caustic strictures	29 (12.5)
Others	26 (11.2)
Unknown	14 (6.0)
Stent type	
FC SEMS	85 (36.6)
BD stent	77 (33.2)
SEPS	70 (30.2)
PC SEMS	0 (0)
Technical success	
Overall	229 (98.7)
FC SEMS	85 (100)
BD stent	77 (100)
SEPS	67 (95.7)
Clinical success	
Overall (n = 231)	56 (24.2)
FC SEMS (n = 85)	12 (14.1)
BD stent (n = 76)	25 (32.9)
SEPS (n = 70)	19 (27.1)

Van Halsema et al. WJGE 2015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Inzisionstherapie

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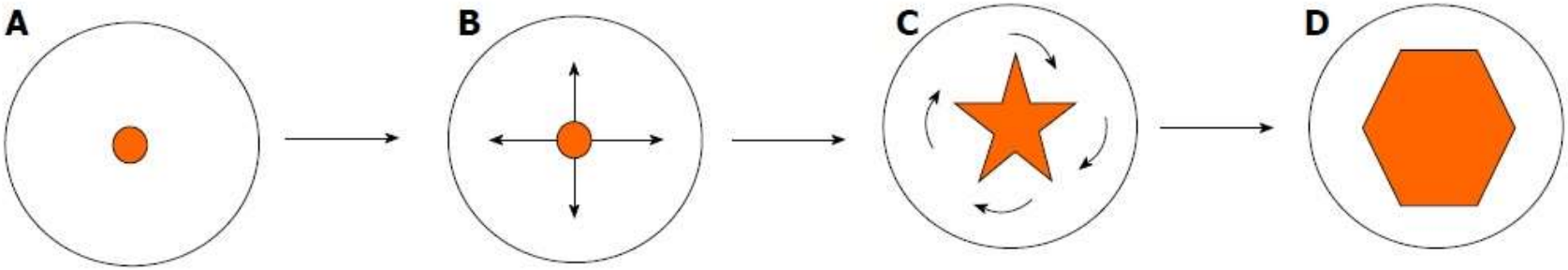

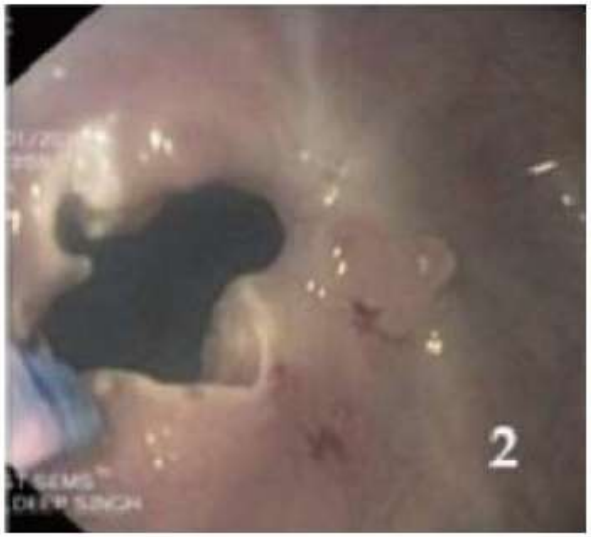

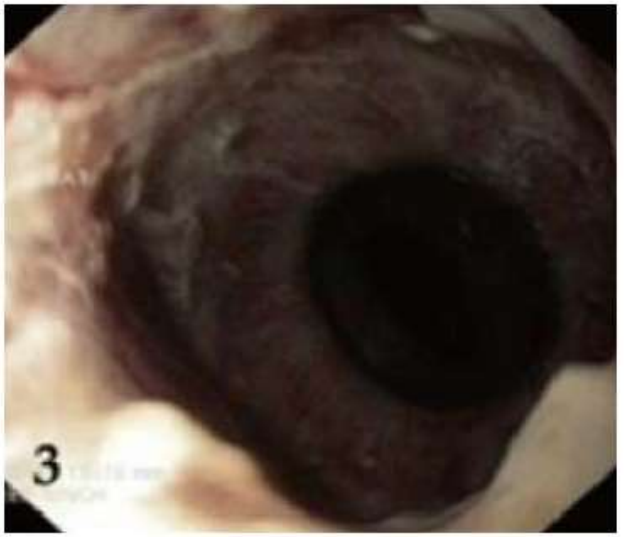

Samanta et al. WJGE 2015

Inzisionstherapie

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Table 3 Various studies of incisional therapy in esophageal anastomotic stricture

Ref.	Type of stricture	No. of patients	Length of stricture	No. of pre-procedure dilatations[1]	Follow-up duration (mo)	Outcome of single session
Schubert *et al*[31], 2003	Treatment naive	15	6.1 mm (3-10 mm)	NA	23	No recurrence - 14/15 (93%)
Simmons *et al*[23], 2006	Refractory	9	--	6	3-14	No dysphagia - 4/9 (44.4%) No response - 1/9 (11%)
Hordijk *et al*[42], 2006	Refractory	20	< 1 cm - 12 cm > 1 cm - 8 cm	8	12	No dysphagia - 12/20 (60%) Recurrence - 8/20 (40%) Treatment failure - 2/20 (10%)
[2]Hordijk *et al*[30], 2009	Treatment naive	EIT arm - 31 SB arm - 31	EIT arm - 1.35 cm SB arm - 0.55 cm (mean)	N/A	6	No difference in the success rate (80.6% *vs* 67.7%) Treatment failure- EIT arm - 1; SB arm - 5
Lee *et al*[24], 2009	Treatment naive	24	< 1 cm - 21 cm > 1 cm - 3 cm	N/A	24	No recurrence - 21/24 (87.5%) Restricture - 3/24 (12.5%)
Muto *et al*[25], 2012	Refractory	EIT - 32 EBD - 22	⩽ 5 mm - 49 mm > 5 mm - 5 mm	10	EIT - 14.8 EBD - 17.2	Short term - 93.8% improvement Long term - EIT better than EBD

Samanta et al. WJGE 2015

Ösophagus: postinterventionell nach ESD

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Risikofaktoren:

- **zirkuläre Resektionsfläche**
  - **< ½ des Lumens bei 2 %**
  - **< ¾ des Lumens bei 20%**
  - **> ¾ des Lumens bei 90%**

- **Longitudinale Resektionslänge > 30mm**

Ono et al. Gastrointest Endosc. 2009; 70(5):860-6.
Ono et al. Endoscopy 2009; 41:661-665.
Ezoe Y et al. J Clin Gastroenterol 2011; 45:222-227.

Ösophagus: postinterventionell nach ESD

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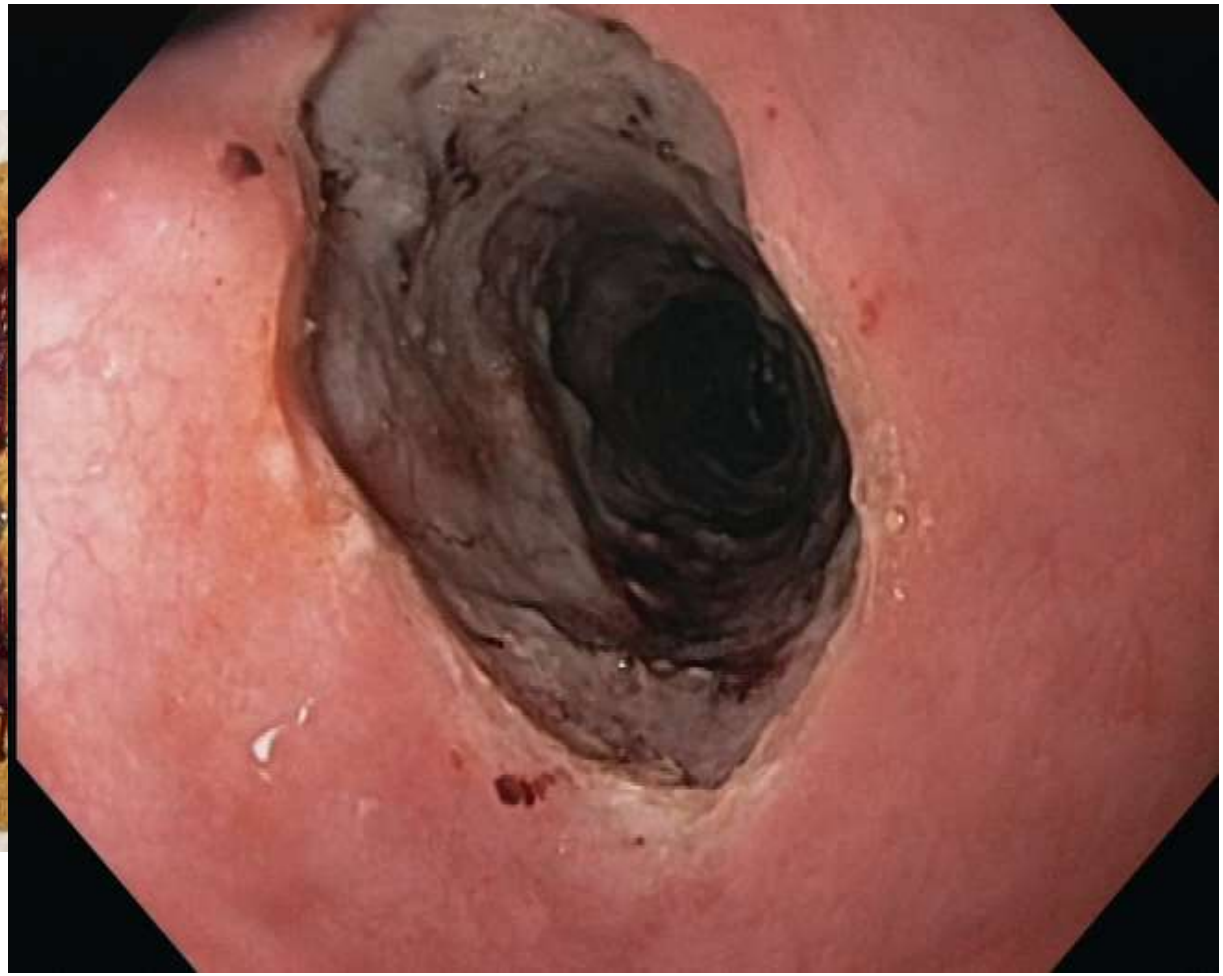

Ösophagus: postinterventionell nach ESD

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Bisherige Therapie

- **Ballondilatation**
- **Bougierung**
- **Stents**

Bisherige Prävention:

- **Prophylaktische Ballondilatation (Uno et al. 2012)**
- **Prophylaktische orale Kortisontherapie (Yamaguchi et al. 2011)**
- **Prophylaktische Kortisoninjektionstherapie (Hashimoto et al. 2011 & Hanaoka et al. 2012)**

Ösophagus: postinterventionell nach ESD

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Studie	Intervention	Anzahl	Strikturen % (n)	Durchführung
Uno et al. 2012	**EBD**	**16**	**68,8%** (11/16)	Einige Tage post-ESD, dann insgesamt 2x/Woche für 8 Wochen
	EBD + Mastzellblocker Tranilast 300mg	15	33,3% (5/15)	Einige Tage post-ESD Tranilast 300mg/d für 8 Wochen
Yamaguchi et al. 2011	**Orale Steroidtherapie**	**19**	**5,3%** (1/19)	ab 3.Tag post-ESD mit einer Dosis von 30 mg/d (30, 30, 25, 25, 20, 15, 10 und 5 mg für 7 Tage jeweils), für insg. 8 Wochen / ein Patient für 12 Wochen
	EBD	22	31,8% (7/22)	ab 3. Tag post-ESD, insgesamt 2x/Woche für 8 Wochen
Hashimoto et al. 2011	**Triamcinolon Injektion 10mg/ml**	**21**	**19%** (4/19)	Am 3., 7. & 10. Tag post-ESD
	Kontrollgruppe	20	75% (15/20)	
Hanaoka et al. 2012	**Triamcinolon Injektion 5mg/ml**	**30**	**10%** (3/30)	Einmalig nach ESD
	Kontrollgruppe	29	66% (19/29)	

Polyglycolic acid sheets (PGA)

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Pilotstudien:

1. Iizuka et al. 2015:

Anzahl n: **13**

Durchführung: **MCFP Technik**

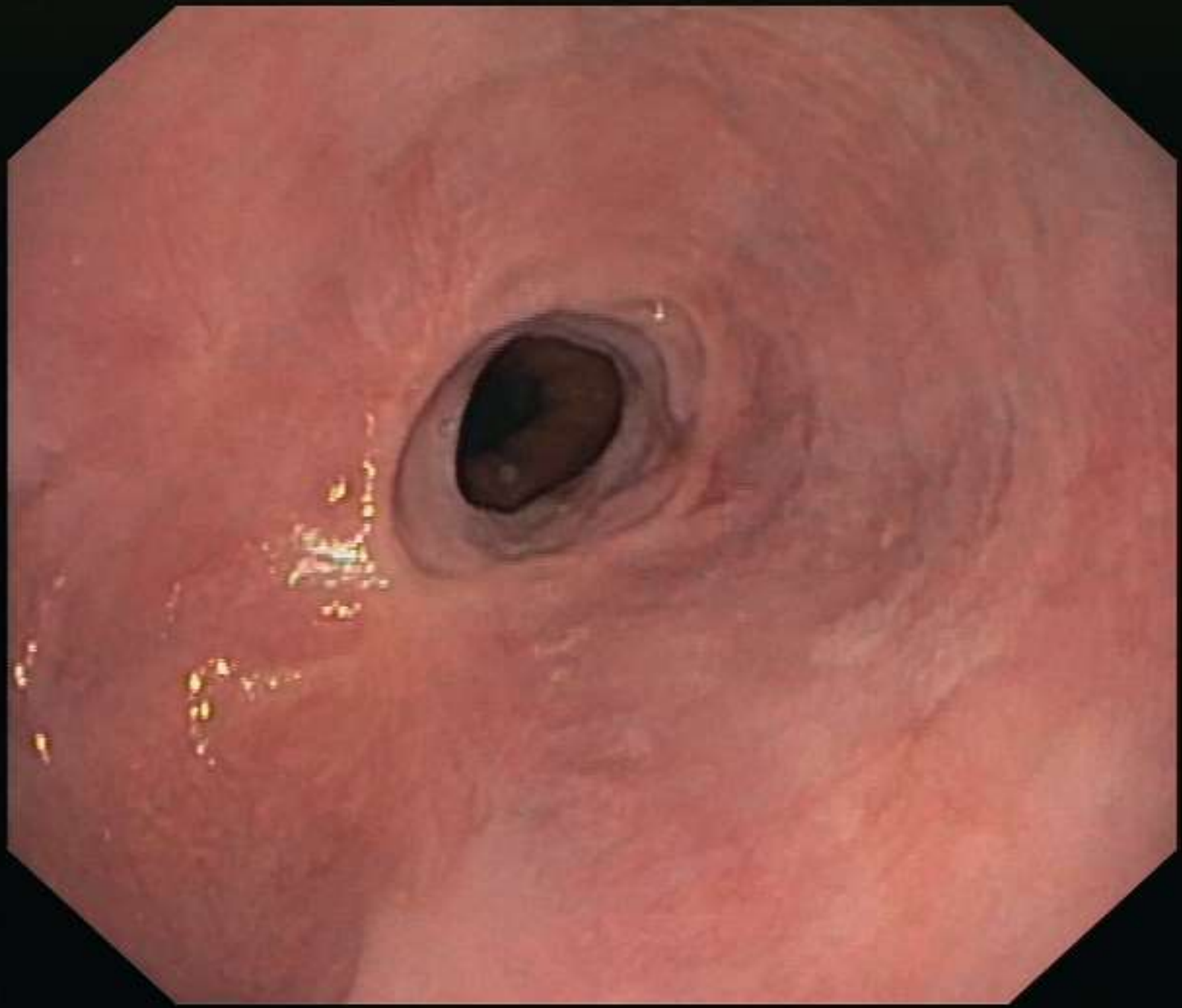
Strikturen % (n): **7,7% (1/13)**

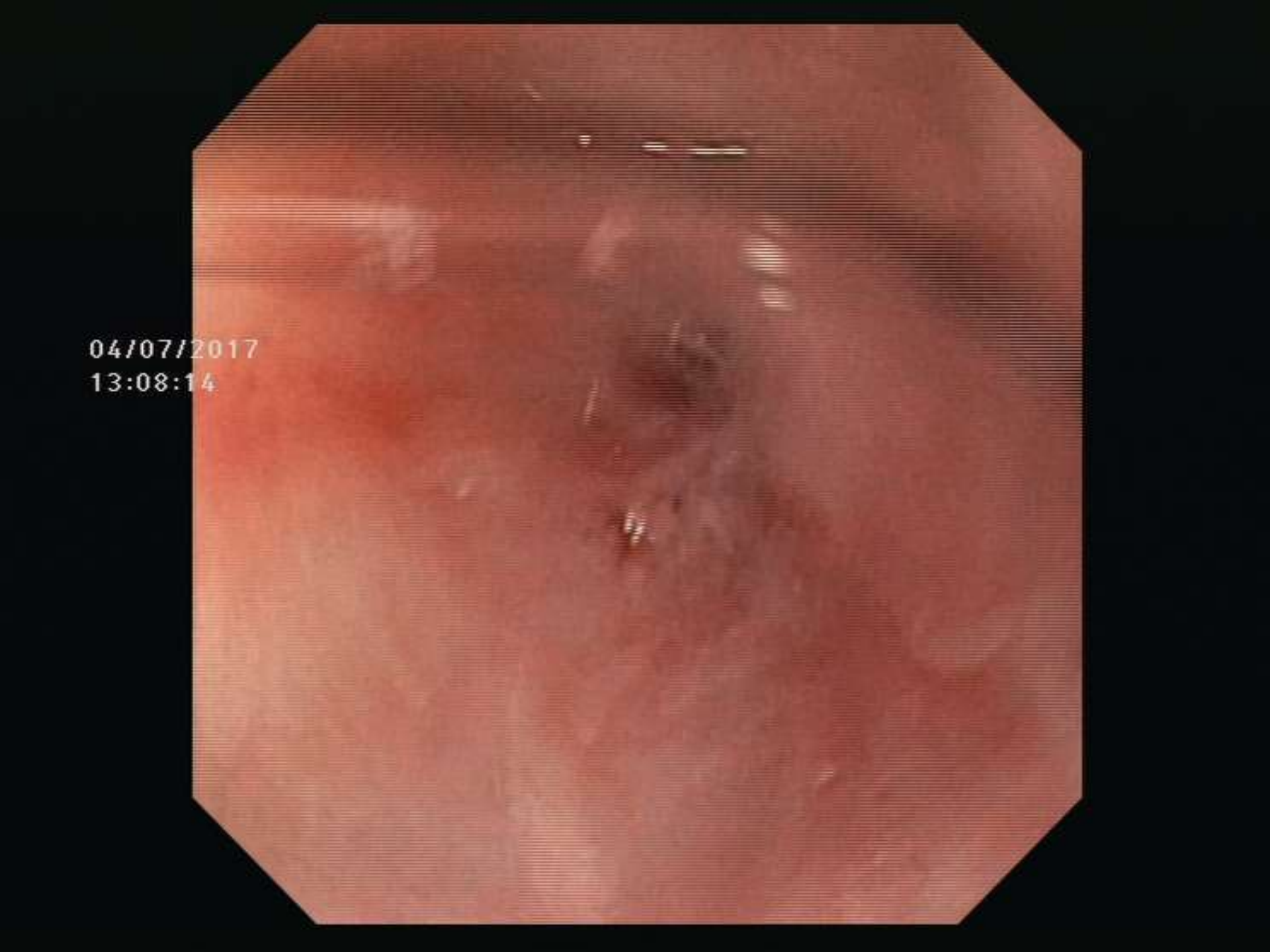
2. Sakaguchi et al. 2015:

Anzahl n: **8**

Durchführung: **„Clip & Pull“ Methode mit Fibrin Kleber**

Strikturen% (n): **37,5% (3/8)**

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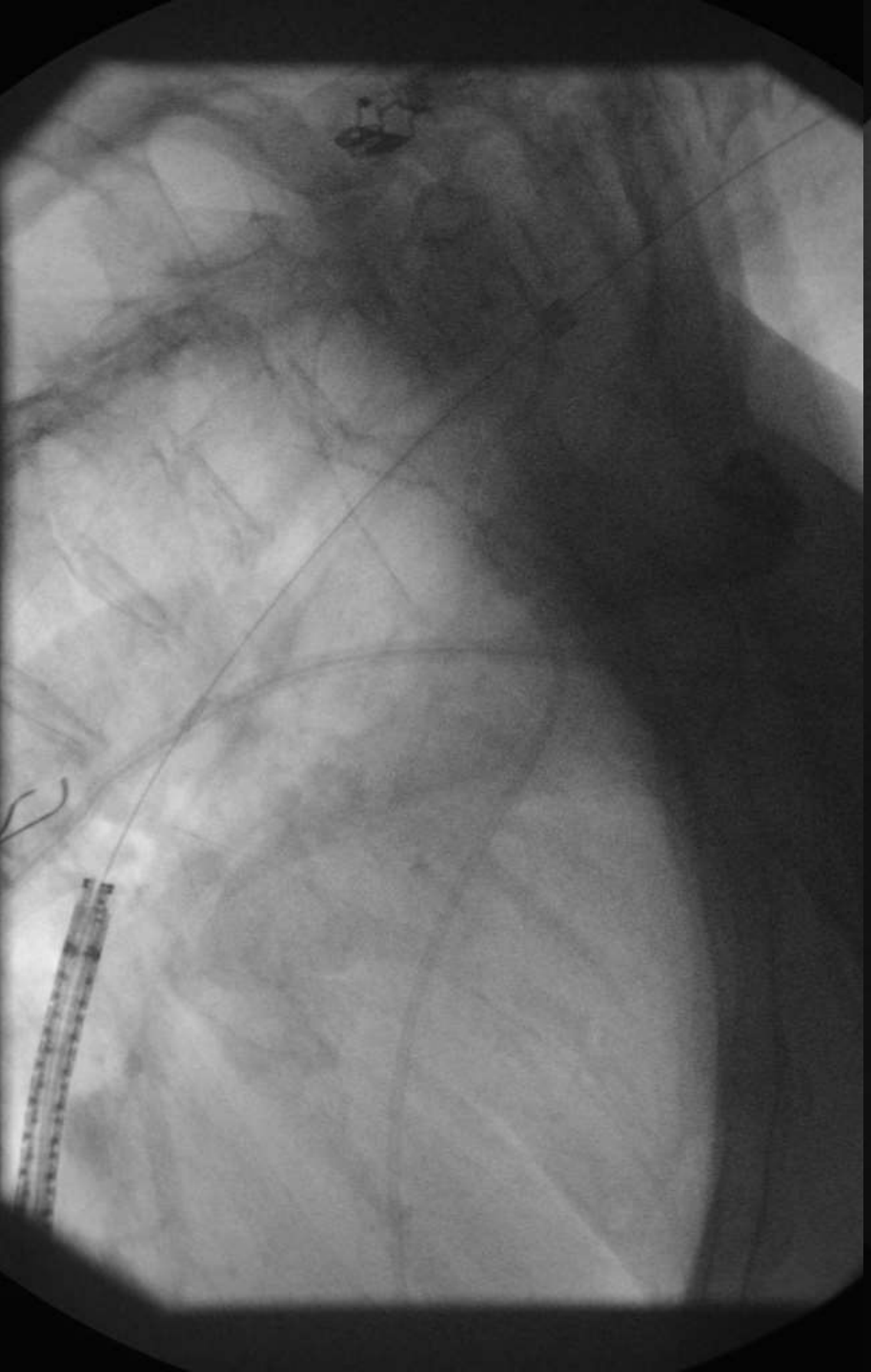
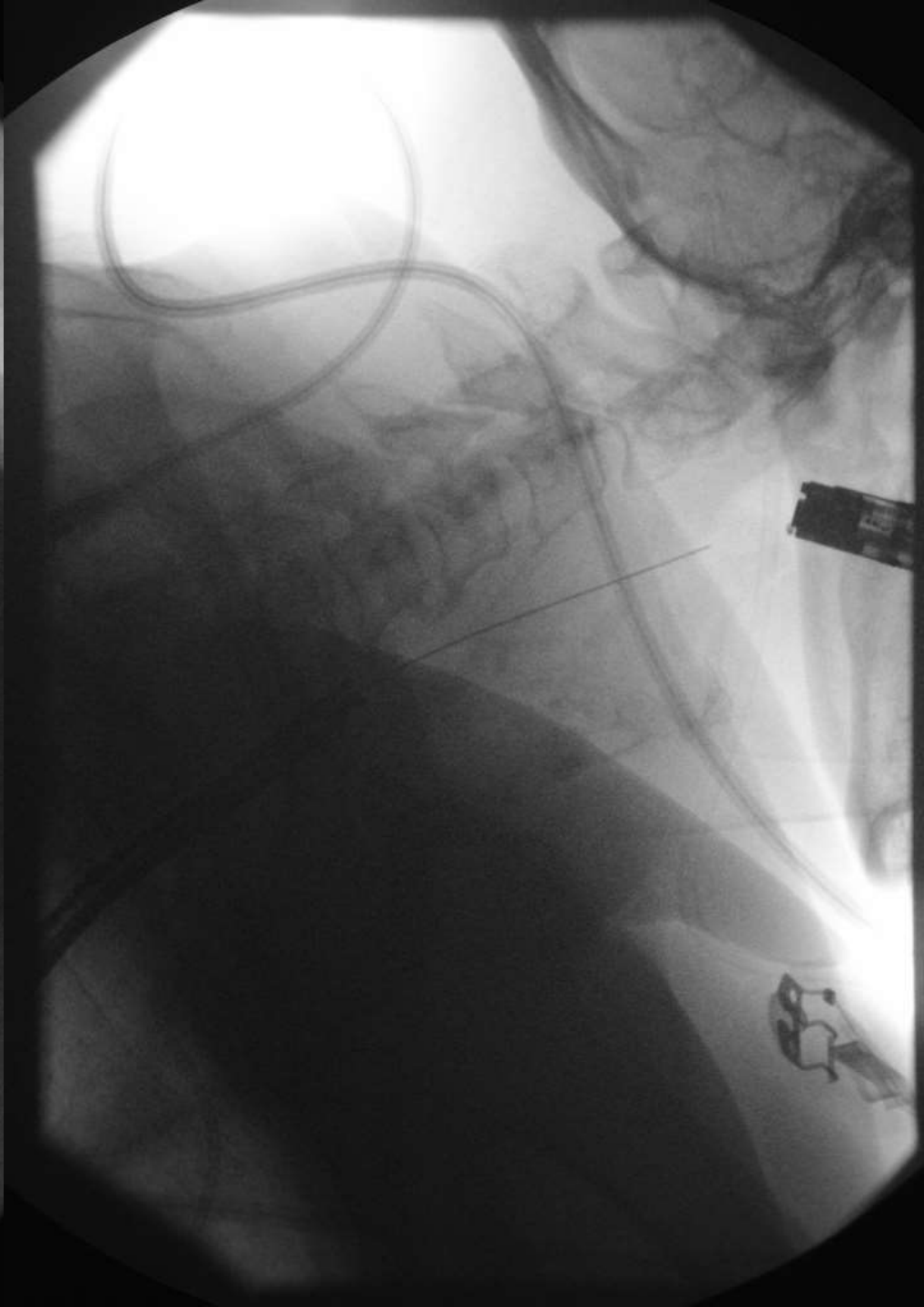

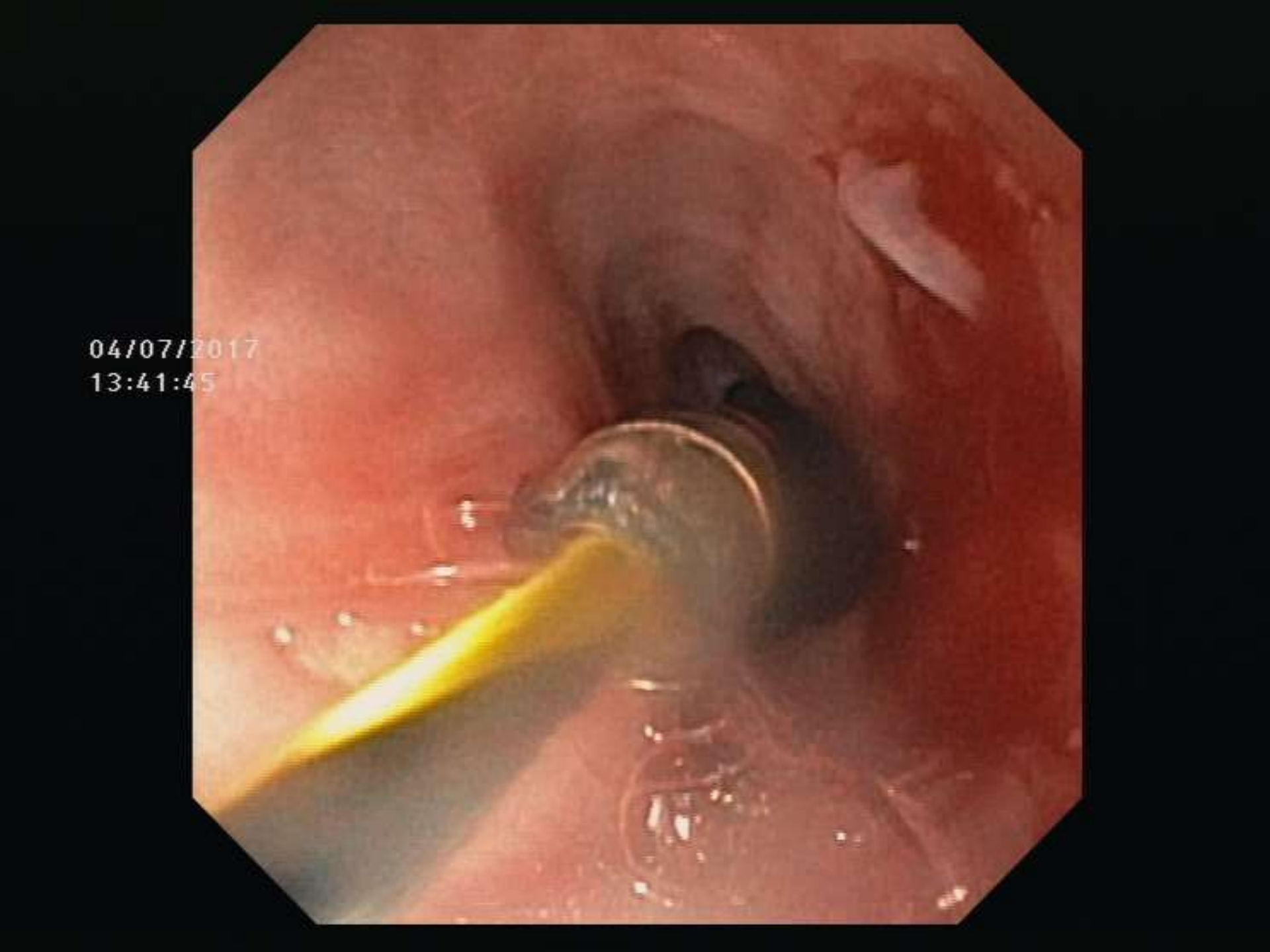
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Therapiealgorithmus

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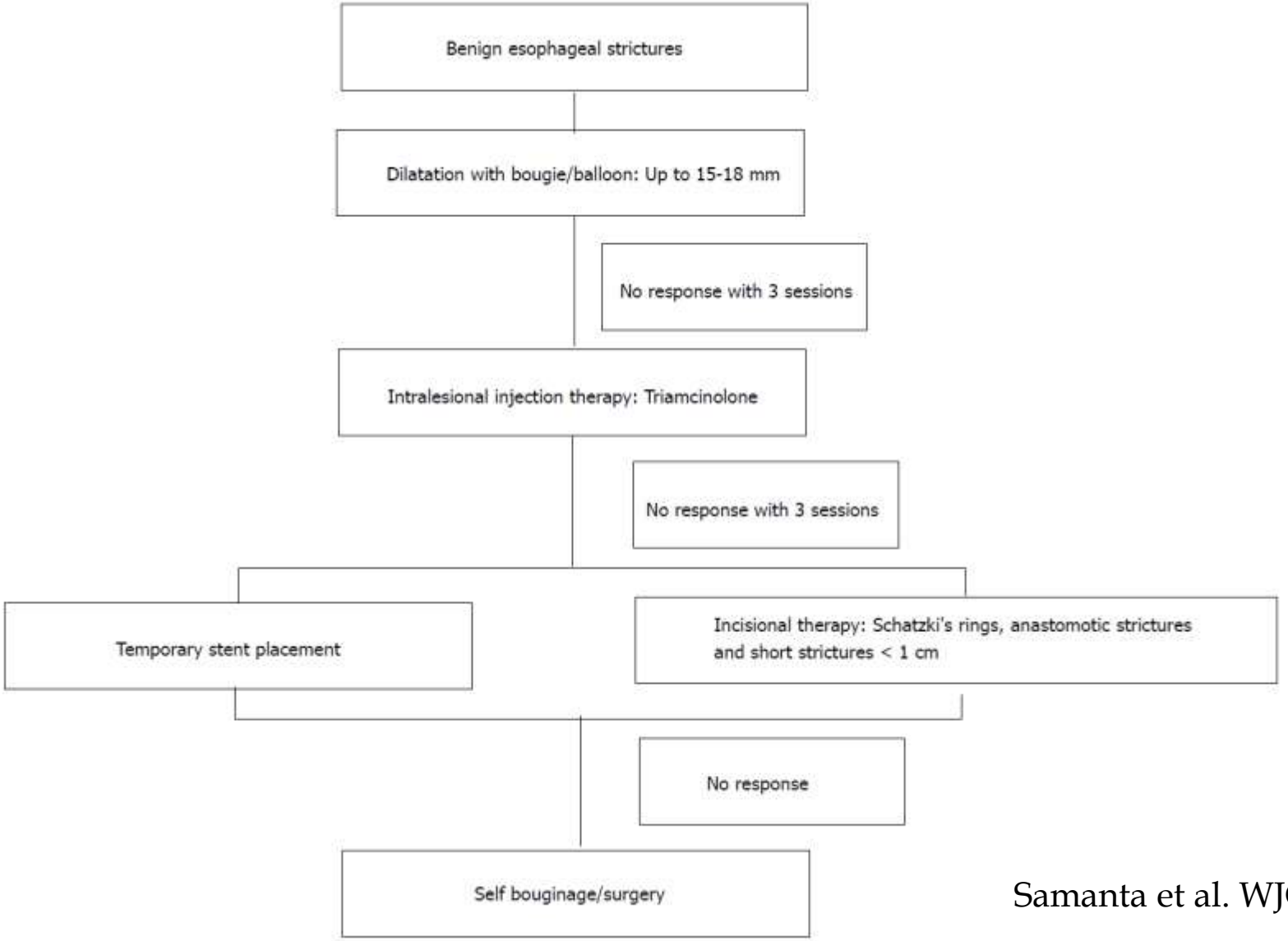

Samanta et al. WJGE 2015

Stent: ESGE Guideline

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ESGE recommends against the use of SEMSs as first-line therapy for the management of benign esophageal strictures because of the potential for adverse events, the availability of alternative therapies, and costs (strong recommendation, low quality evidence).

ESGE suggests consideration of temporary placement of self-expandable stents for refractory benign esophageal strictures (weak recommendation moderate quality evidence).

ESGE does not recommend a specific type of expandable stent (covered metal, plastic, biodegradable) because none has been shown to be superior to any other for this indication (strong recommendation, moderate quality evidence).

Spaander et al. Endoscopy 2016

Stent: ESGE Guideline

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ESGE does not recommend permanent stent placement for refractory benign esophageal stricture; stents should usually be removed at a maximum of 3 months (strong recommendation, weak quality evidence).

ESGE suggests that FCSEMSs be preferred over PCSEMSs for the treatment of refractory benign esophageal stricture, because of their lack of embedment and ease of removability (weak recommendation, low quality evidence).

ESGE suggests that a combined approach of stent placement with additional techniques (e. g., corticosteroid injection, chemotherapeutic topical application) should not be used in an attempt to improve the long-term benefit of temporary stenting (weak recommendation, very low quality evidence).

Spaander et al. Endoscopy 2016

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Vielen Dank
für Ihre Aufmerksamkeit

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Ösophagus: Radiogen

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Clinical Outcomes

Factors	**number (% or std dev)**
Technical Success[i]	63 (100%)
Clinical Success[ii]	52 (83%)
Dilations to achieve initial patency[iii], mean	3.3 (std dev 2.6)
Weeks to achieve initial patency[iii], median (IQR)	4 weeks (0,12)
Complications	3 (4.8%)[v]
Recurrence[iv]	17 (33%)
Time to recurrence, median (IQR)	22 weeks (17.3, 49.3)
Dilations to reestablish patency, mean	2 (std dev 1.9)

Agarwalla et al. Surg Endosc 2015

Ösophagus: Radiogen

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Risk Factors for Radiation-Induced Refractory Stricture After Dilation in the Univariate and Multivariat Analyses*

Risk Factor	Unadjusted Odds Ratio (95% CI)¶	Univariate P-Value	Adjusted Odds Ratio (95% CI)**	Multivariate P-Value
Significant in univariate and multivariate analyses				
Female Sex@	2.9 (1.03 – 8.17)	0.04	3.76 (0.82 – 17.25)	0.09
Use of Fluoroscopy	23.75 (4.74 – 119)	< 0.001	22.88 (3.19 – 164.07)	0.002
Severe Stenosis	8.75 (2.52 – 30.42)	0.001	10.51 (1.94 – 56.88)	0.006
History of Extrinsic Cancer (Proximal Location)	3.9 (1.22 – 12.4)	0.02	6.96 (1.33 – 36.29)	0.02
Not significant in univariate or multivariate analysis				
Presence of anastomosis (Head/neck cancer only)	1.14 (0.40 – 3.30)	0.80		
Prior chemotherapy	0.65 (0.22 – 1.91)	0.43		
Middle age (45–64 years old)#	0.71 (0.1 – 4.93)	0.73		
Older Age (>64 years old)#	1.33 (0.19 – 9.19)	0.77		

Agarwalla et al. Surg Endosc 2015

Ösophagus: EoE

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	No Dilation (n = 345)	Dilation (n = 164)	p*
Age at diagnosis (mean yrs ± SD; range)	20.7 ± 17.6 (0.6-73.5)	38.6 ± 15.2 (10.7-82.0)	<0.001
Adults (≥ 18 year; n, %)	110 (36)	134 (91)	< 0.001
Symptom length prior to diagnosis (mean yrs ± SD)	5.4 ± 6.8	11.1 ± 11.1	<0.001
Males, n (%)	251 (73)	112 (68)	0.30
White, n (%)	269 (79)	143 (89)	0.006
Symptoms, n (%)			
Dysphagia	186 (55)	157 (96)	<0.001
Food impaction	89 (27)	73 (49)	<0.001
Heartburn	144 (43)	45 (30)	0.007
Chest pain	32 (10)	19 (13)	0.33
Abdominal pain	95 (28)	13 (9)	<0.001
Vomiting	105 (32)	26 (17)	0.001
Failure to thrive	54 (16)	3 (2)	<0.001
EGD Findings, n (%)			
Normal	72 (21)	3 (2)	<0.001
Rings	107 (31)	118 (72)	<0.001
Stricture	11 (3)	82 (50)	<0.001
Narrowing	21 (6)	50 (30)	<0.001
Furrows	154 (45)	89 (54)	0.06
Crepe-paper mucosa	15 (4)	8 (5)	0.81
White plaques	89 (26)	49 (30)	0.38
Erythema	27 (8)	10 (6)	0.46
Decreased vascularity	73 (21)	42 (26)	0.30
Erosive esophagitis	90 (26)	44 (27)	0.93
Max eosinophil counts (mean eos/HPF ± SD)	79.1 ± 75	81.8 ± 77	0.71

Runge et al. Am J Gastro 2016

Ösophagus: EoE

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	Any Dilation (n = 164)
Total number of dilations	486
Number of dilations per patient (mean ± SD)	3.0 ± 3.7
Dilation Method, n (%)	
Savary	91 (19)
Balloon	395 (81)
Esophageal diameter (mm) before dilation (mean ± SD)	12.5 ± 3.0
Esophageal diameter (mm) after final dilation (mean ± SD)	15.2 ± 2.9
Increase in esophageal diameter (mean mm ± SD)	2.6 ± 1.4
Symptom response, n (%)[‡]	108 (87)
Complications, n (%)	
Any complication	25 (5.1)
Pain	21 (4.3)
Bleeding	0 (0)
ER visit	5 (1.0)
Hospitalization	2 (0.4)
Perforation	0 (0)
Death	0 (0)

Runge et al. Am J Gastro 2016

Ösophagus: Stent vs. Ballon

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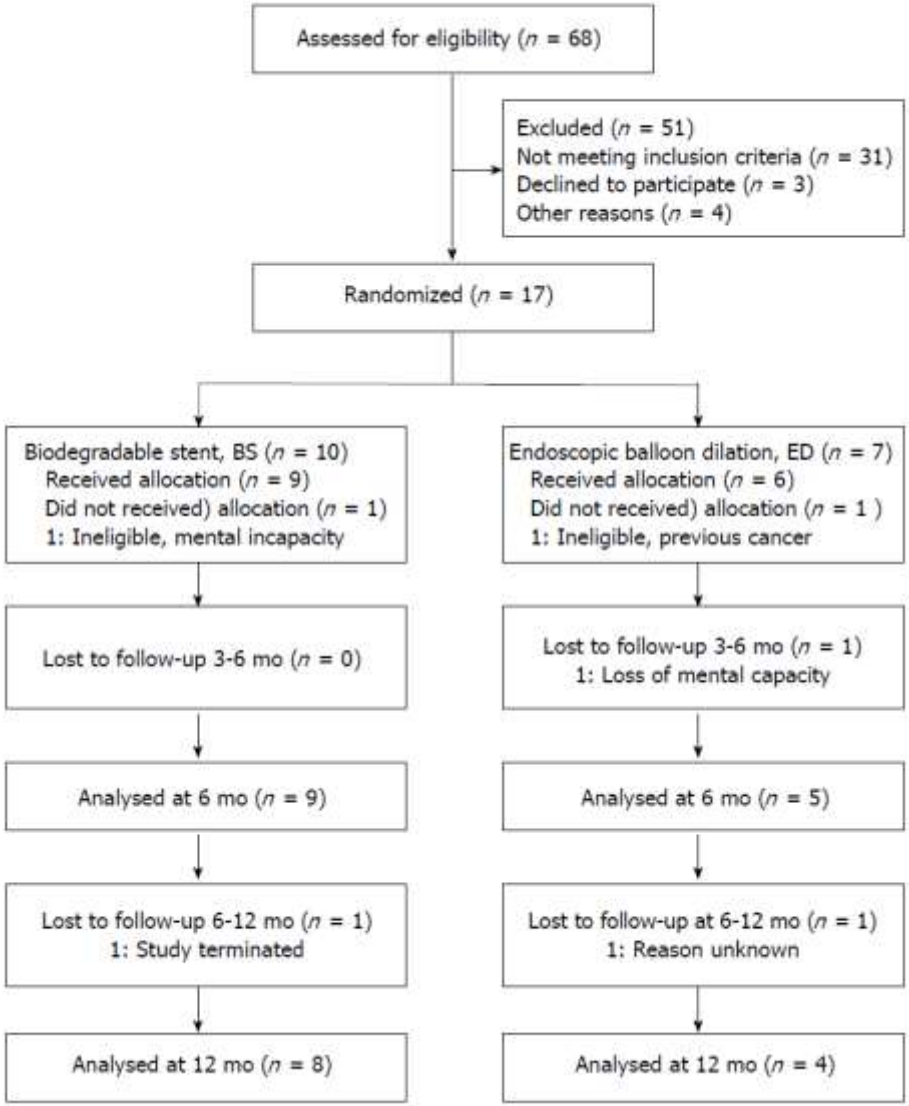

Dhar et al. WJG 2014

Zukunft

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Vivantes Klinikum im Friedrichshain Fach-Pressemitteilung 15. Februar 2017

„Erste erfolgreic protektiver Dünndarmschlei chliche Speiseröhre“

M. Crohn

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Patient characteristics: 46 patients/69 strictures	
Number of dilatations	118
% female/% male	41/59
Mean age (range)	48 (27–83)
Disease duration (median)	222 (1–419) months
Median follow up	4.8 years
% previous surgery	61
% anastomotic vs. de novo	38 vs. 62
% smokers	36
% disease location (n/total no. of stenoses)	
Ileocolonic	39 (27/69)
Ileum	27 (19/69)
Colon	22 (15/69)
Duodenum	4 (3/69)
Jejunum	4 (3/69)
Rectum	2 (1/69)
Ileorectal	2 (1/69)
% medical therapy at first dilatation (n/total no. of pts)	
No medical therapy	15 (7/46)
5-ASA	2 (1/46)
Corticosteroids	35 (16/46)
Anti-metabolites	41 (19/46)
Anti-TNF	7 (3/46)
% multiple (>1) medical therapy at first dilatation	28 (13/46)
% inflammation	
Not active	40 (18/45)
Acute	38 (17/45)
Chronic	22 (10/45)

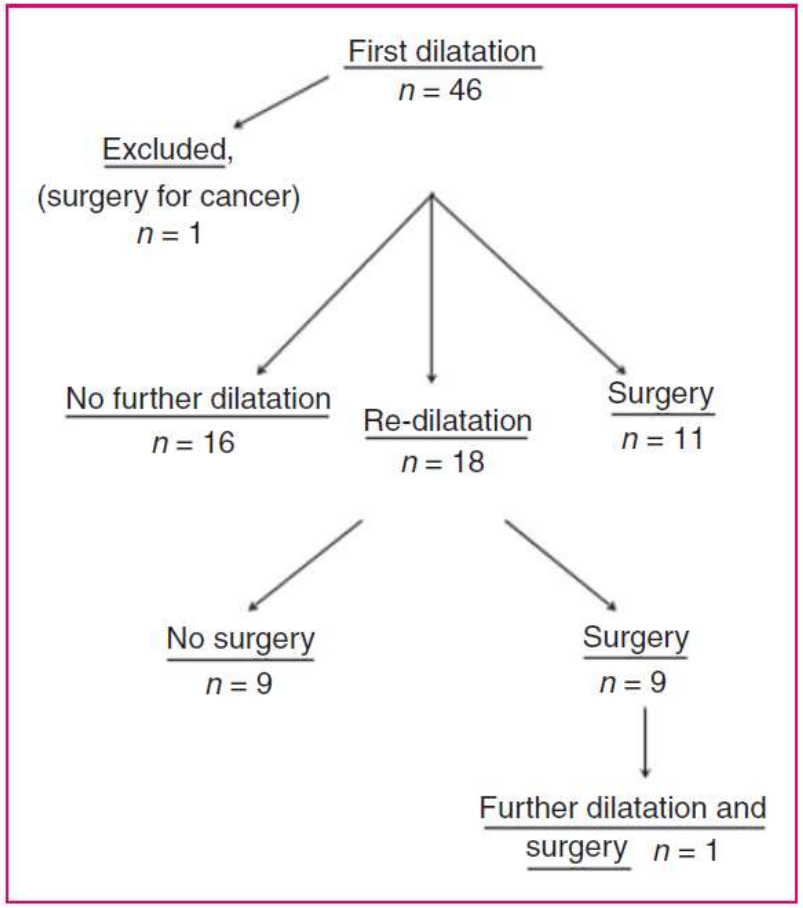

Figure 1. Long-term follow-up.

Guzman et al. UEGW 2016

M. Crohn

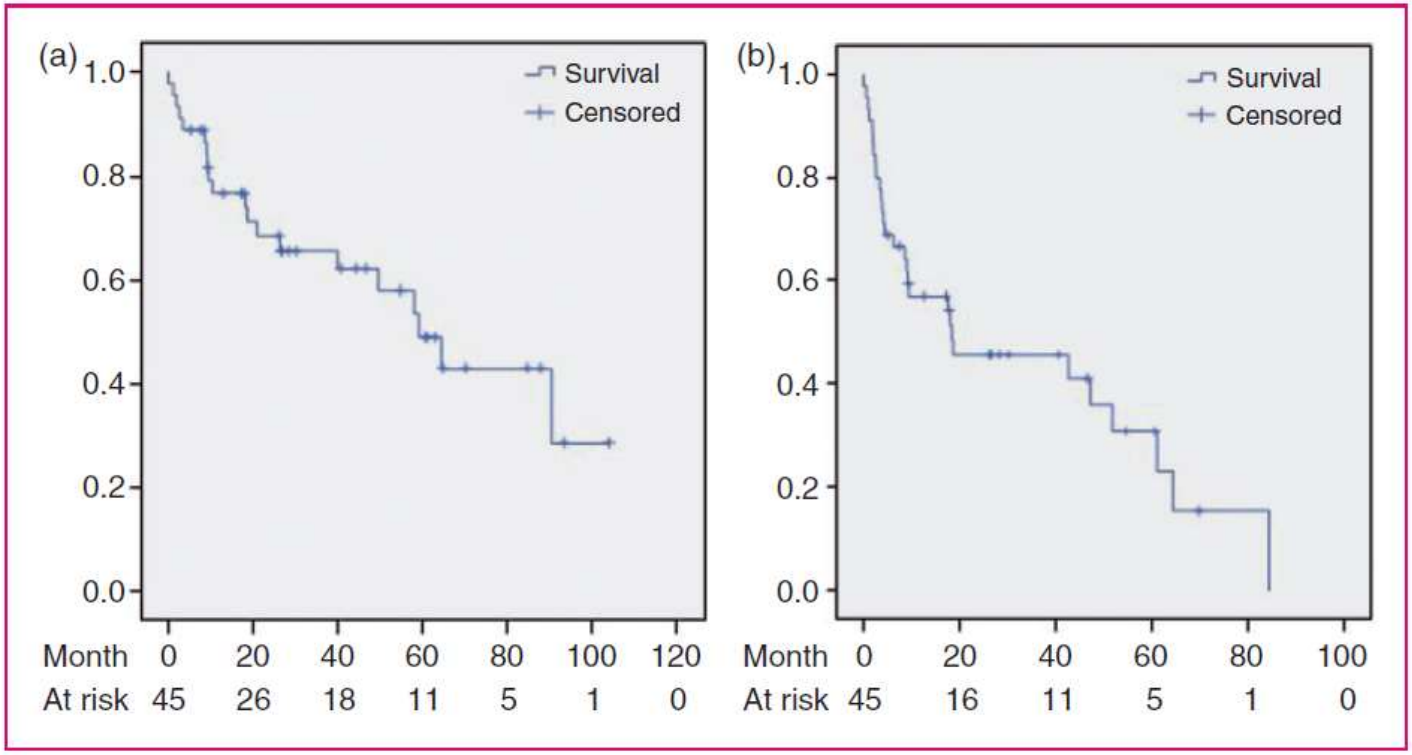

Figure 2. Kaplan-Meyer analysis of (a) surgery-free survival (months), (b) dilatation- and surgery-free survival (months).

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Colon: Ballon vs. Stent

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Table 2. Short-Term Clinical Efficacy and Complications of Balloon Dilatation and Self-Expandable Metal Stent Placement

Variable	Balloon dilatation	SEMS placement	p-value
Short-term clinical efficacy			
Technical success	64 (98.5)	16 (94.1)	0.374
Clinical success*	57 (89.1)	14 (87.5)	>0.999
Reobstruction†	31 (54.4)	8 (57.1)	>0.999
Procedural failure	39 (60.0)	11 (64.7)	0.723
Complication			
Perforation	2 (3.1)	0	NA
Fistula	1 (1.5)	0	NA
Bleeding	0	0	NA
Migration‡	NA	5 (31.3)	NA
Total	65	17	

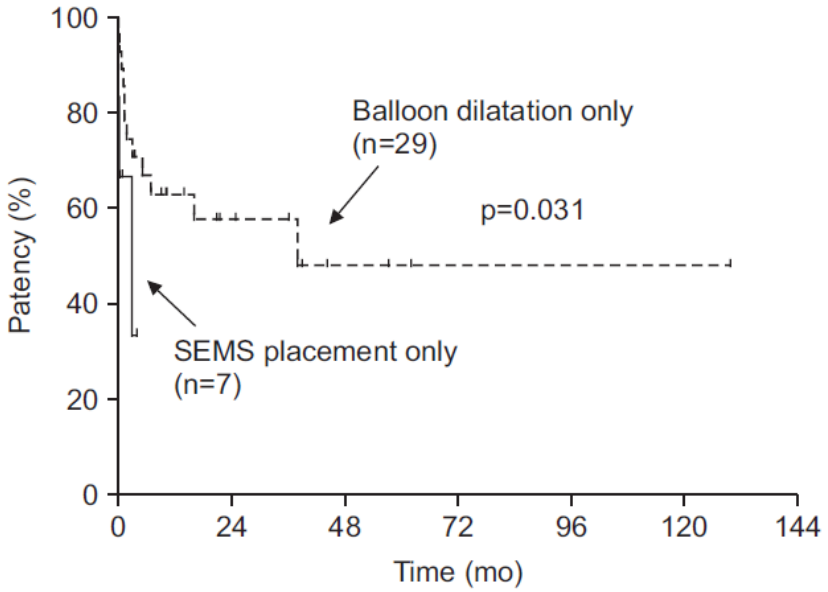
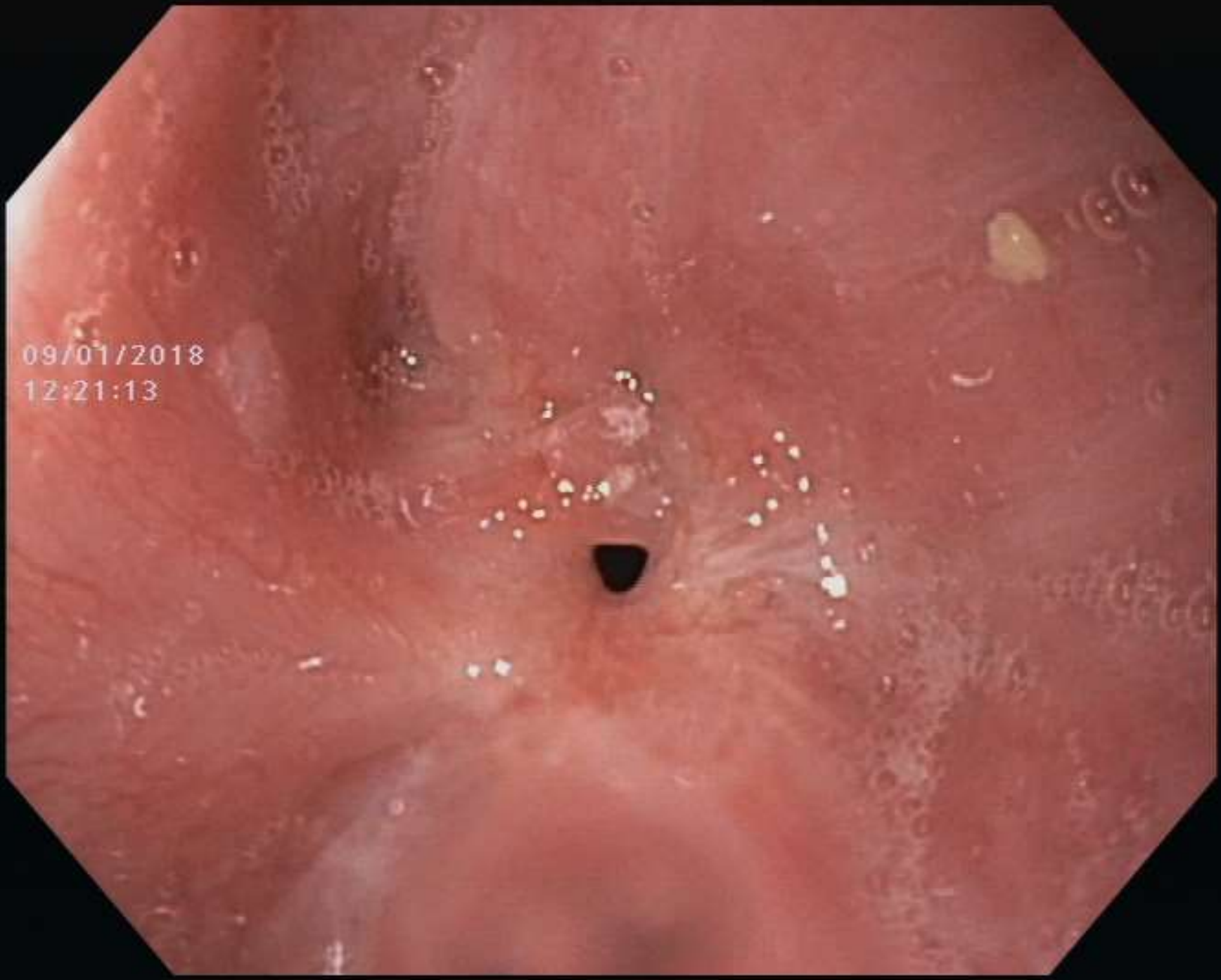


Fig. 2. Kaplan-Meier plots of the patency of initial endoscopic treatments in 29 patients who underwent balloon dilatation only and seven patients who underwent self-expandable metal stent (SEMS) placement only.

Park et al. Gut Liver 2015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Ösophagus: Stent

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Table 2 Clinical outcomes following stent placement

Reference	Median stent placement time, days (range)	Median follow-up after stent removal, days (range)	Success, n (%)	Complications, n (%)	Migration, n (%)
Song, 2000 [22]	29	395	12 (48)	17 (68)	3 (12)
Repici, 2004 [21]	42	684 (518 – 821)	12 (80)	5 (33)	1 (7)
Evrard, 2004 [18]	–	590 (600 – 1170)	8 (67)	2 (17)	8 (67)
Karbowsky, 2007 [25]	52 (14 – 266)	–	5 (36)	2 (14)	6 (43)
Dua, 2008 [17]	28	372 (77 – 1094)	12 (32)	12 (32)	8 (21)
Martin, 2008 [28]	93	455 (120 – 850)	17 (94)	1 (6)	1 (6)
Kim, 2009 [26]	56	1150 (30 – 3170)	13 (26)	14 (27)	13 (26)
Repici, 2010 [6]	74 (63 – 84)[1]	–	9 (43)	3 (14)	2 (10)
Oh, 2010 [29]	82 (30 – 257)	–	3 (23)	0	7 (54)
Bakken, 2010 [23]	67 (0 – 279)	–	13 (52)	5 (20)	11 (44)
Van Boeckel, 2011 [5]	42 for SEPSs 74 (63 – 84) for BDSs*	385 (77 – 924) for SEPSs 166 (21 – 559) for BDSs	12 (32)	6 (16)	9 (24)
Eloubeidi, 2011 [24]	64 (6 – 300)	161 (24 – 360)	4 (21)	5 (26)	7 (37)
Hirdes, 2012 [20]	61 (13 – 222)	86 (14 – 330)	0	5 (33)	7 (47)
Hirdes, 2012 [19]	42	630 (21 – 1121)	7 (25)	8 (29)	3 (11)
Liu, 2012 [27]	74 (63 – 84)[1]	365	18 (75)	0	1 (4)
Canena, 2012 [15]	90 for FC-SEMSs 90 for SEPSs 74 (63 – 84) for BDSs[1]	702 (240 – 1980) for FC-SEMSs 1281 (480 – 1980) for SEPSs 555 (330 – 660) for BDSs	8 (27)	2 (7)	11 (37)
Chaput, 2013 [16]	58 (20 – 140)	730	21 (51)	5 (12)	12 (29)
Dan, 2014 [7]	71 (1 – 265)	380 (72 – 1150)	5 (29)	0	9 (53)

Fucio et al. Endoscopy 2015

Ösophagus: Radiogen

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Steroid Injections

	Steroid Injection (N=5)	No steroids (N=40)	p-value
Dilations to initial patency, median (IQR)	8 (6, 8)	3 (2, 5.5)	<0.001
Weeks to initial patency, median (IQR)	30 (12, 36)	9 (2.6, 13)	0.03

Agarwalla et al. Surg Endosc 2015