Endovascular repair of aorto-enteric fistula A bridge to surgery?

Frank Vermassen Ghent University Hospital Belgium

### Disclosures

No disclosures related to this presentation

### Aorto-Enteric Fistula (AEF)

# Primary AEF: Aneurysm, infection (mycotic,TBC) Secondary AEF: ≤ 1% prevalence after aortic surgery





## Sec. AEF – Literature review

### 1467 Patients

Table 3Presenting symptoms in patients with a verifiedarterioenteric fistula

	No	%
Melaena	178	(54)
Haematemesis	137	(41)
Gastrointestinal bleeding,	29	(9)
unspecified		
Fall in haemoglobin	51	(16)
Shock	101	(31)
Abdominal pain	70	(21)
Back pain	20	(6)
Pulsating tumour in abdomen	18	(6)
Anorexia	19	(6)
Fever	35	(11)
Sepsis	38	(12)
Abscess penetrating skin	10	(3)
Septic embolization	7	(2)
Graft occlusion	5	(1)
Ileus	1	(0.3)

Each patient may have more than one symptom, explaining why the sum exceeds 100%.

### **Bergqvist EJVES 2009**

Bleeding dominating symptom

- Herald bleedings in more than half, shock in 1/3
- Infectious problems in around 1/4
- Median time to occurrence: 47 m (2d-26y)

Table 5	Bowel segment involved in arter	rioenteric fistula
	п	(%)
Stomach	2	(1)
Duodenum	233	(70)
Jejunum	40	(12)
lleum	22	(7)
Colon	25	(8)
Appendix	1	(3)
Unknown	3	(1)

In five patients there were two fistulae.

### AEF – Literature review

## Mortality: 50%Life-threatening condition

Table 6Mortality with regard to reconstructive solution –the main categories. Based on papers presenting individualcases

	No of procedures	No of deaths	Mortality (%)
Graft removal and axillobifemoral bypass	72	30	42
Axillobifemoral bypass and graft removal	23	5	22
Graft removal and new graft in situ	56	21	38
Suture (±patch)	59	33	56
All	210	89	42

### **Bergqvist EJVES 2009**

Table 8Mortality with regard to reconstructive solution.Based on papers presenting case series

	No of procedures	No of deaths	Mortality %
Graft removal and axillobifemoral bypass	163	83	51
Axillobifemoral bypass and graft removal	16	5	31
Graft removal and new graft in situ	96	45	47
Suture (±patch)	80	52	65
Graft removal and closure	20	19	95
Explanation. No specific treatment	20	20	100
All	395	224	57

### Endovascular Repair of an Aortoenteric Fistula in a High-Risk Patient

Arvind Deshpande, MS, FRCS; Mark Lovelock, FRACS; Peter Mossop, FRACR\*; Michael Denton, FRACS; John Vidovich, FRACS; and John Gurry, FRCS, FRACS

Departments of Vascular Surgery and \*Interventional Radiology, St. Vincent's Hospital, Melbourne, Australia

J Endovasc Surg 1999;6:379–384

Endovascular Repair of a Presumed Aortoenteric Fistula: Late Failure Due to Recurrent Infection

Timothy A.M. Chuter, MD; Gregory C. Lukaszewicz, MD; Linda M. Reilly, MD; Robert K. Kerlan, MD\*; Rishad Faruqi, MD; Raj Sawhney, MD\*; Susan D. Wall, MD\*; Catherine Canto, RN; Jean M. LaBerge, MD\*; Roy L. Gordon, MD\*; and Louis M. Messina, MD

J Endovasc Ther 2000;7:240–244

### **Benelux AEF-EVAR Study**

### Multicentric, retrospective study

- Ghent University Hospital (M. Danneels, F. Vermassen)
- University Medical Center Utrecht (H. Verhagen)
- Leuven University Hospitals (A. Nevelsteen)
- Atrium Medical Center Heerlen (J. Teijink)
- Catharina Hospital Eindhoven (Ph. Cuypers)

All patients treated with endograft for AEF

### **Patient Demographics**

15 patients (1998-2004)

- M:F ratio 12:3
- Age 43-82y (mean 68y)
- Medical history
  - 13/15 previous aortic surgery
  - 12/15 previous non-vascular abdominal surgery
  - 4/15 severe pulmonary disease
  - 3/15 severe cardiac disease

### **Previous Aortic Surgery**

1 patient

Elective aortic surgery 8 patients; 1.7-307m, mean 77m Emergency AAA repair 1 patient; 60m Open repair for infected graft 3 patients; 1.7-35m mean 13m EVAR for false aneurysm homograft 1 patient; 6m Tuberculous aortitis 1 patient Unknown origin

### Symptoms & Diagnosis

8/15 haematemesis
8/15 melena, 7/15 anal blood loss
11/15 abdominal complaints
8/15 haemodynamic shock

Positive CT: 13/13
 Positive gastroscopy: 3/11
 Positive angiography: 0/1



## Treatment

- 8/15: emergency setting
   Devices:
  - 10/15: aortomonoiliac device
     7/10: + femfem crossover
  - 3/15: aortobiiliac device
  - 1/15: tube graft
  - 1/15: two occluders + axillofemoral graft
- Staged approach in 2 patients
  - Repair of AEF at D4 + aortic tube graft
  - Aortobiiliac prosthesis + D3 repair + omentoplasty
- Long term antibiotic treatment



## Early Results

All AEF were sealed successfully

Mean hospital stay: 20 (2-81) days

Complications: 9/15

- renal (4/15) > infectious (3/15) > gastrointestinal (3/15) > pulmonary (2/15) > cardiac (2/15) > vascular (1/15)

Early re-interventions: 2/15

- Drainage groin abscess (D13)
- Hepatorenal shunt (D26)
   Drainage duodenal necrosis (D51)
- 1 in-hospital mortality (D81): 7%

## Late Results (1)

1 unrelated death (lung cancer)
 Reinfection or new AEF: 9/13 pts (64%)

 Mean Interval: 9.5 (0.61-31) months

# Reinterventions: 1/9 ex situ repair 8/9 in situ repair 1/9 arterial homograft 8/9 synthetic graft



## Late Results (2)

4/13 patients without reinfection or new AEF

- Mean FU 16 (1-44) months

9/13 patients with reinfection or new AEF

- 7/9 treated successfully (FU 1-23m, mean 11m)
- 1/9 refused treatment for recurrent bleeding 2 days postop
- 1/9 MSOF; † 2m

Overall AEF related mortality = 20%



## Comparative study: open or endovascular repair for AEF

- Multi-(6)centric retrospective comparative study (Greece)
- 25 patients with AEF (1998-2009)
  - 8 endovascular repair 17 open repair
- Patient characteristics comparable in both groups
- Early results
  - In hospital mortality: 0% (EV) vs 35% (open).
  - Morbidity after repair: 25% (EV) vs 77% (open)
  - Median hospitalization: 10 d (EV) vs 21 d (open)
- Late results
  - More recurrences, more sepsis, more re-operations in EV group
  - Early survival advantage for EV repair was lost after 2 years
  - Overall long-term survival rates similar



Kakkos et al. EJVES 2011

## Outcome after endovascular stent graft repair of aortoenteric fistula: A systematic review

George A. Antoniou, MD,<sup>a</sup> Stylianos Koutsias, MD,<sup>a</sup> Stavros A. Antoniou,<sup>a</sup> Andreas Georgiakakis, MD,<sup>a</sup> Miltos K. Lazarides, MD, EBSQvasc,<sup>b</sup> and Athanasios D. Giannoukas, MD, MSc, PhD, EBSQvasc,<sup>a</sup> Larissa and Alexandroupolis, Greece (J Vasc Surg 2009;49:782-9.)

Is EVAR the treatment of choice for aortoenteric fistula?

L. LONN <sup>1, 2</sup>, N. DIAS <sup>3</sup>, T. VEITH SCHROEDER <sup>1</sup>, T. RESCH <sup>3</sup>

J CARDIOVASC SURG 2010;51:319-27

2011;18:66-77

**Endovascular Management of Arterioenteric Fistulas**: A Systemic Review and Meta-Analysis of the Literature

Stavros K. Kakkos, MD, MSc, PhD, DIC, RVT; Spyros Papadoulas, MD, PhD; and Ioannis A. Tsolakis, MD, PhD JENDOVASC THER

99 patients in 55 publications

### Recurrent or persistent infection or hemorrhage in 44% after 13 m.

Table II. Analysis of potent predictors of persistent/recurrent/new infection after endovascular management of AEF

Variable	Persistent/recurrent/new infection n = 18 (%)	Healed n = 23 (%)	P value	OR (95% CI)
Age >70 years	9 (50.00%)	9 (39.13%)	.486	1.556 (0.447-5.413)
Male sex	16 (88.89%)	16 (69.57%)	.138	3.500 (0.628-19,496)
Primary/secondary AEF	5/13 (27.78%/72.22%)	13/10 (56.52%/43.48%)	.066	0.296 (0.079-1.108)
AA/TA	10/8 (55.56%/44.44%)	13/10 (56.52%/43.48%)	.951	0.962 (0.278-3.331)
Cancer	3 (16.67%)	7 (30.43%)	.308	0.457 (0.099-2.101)
Hemodynamic instability	9 (50.00%)	13 (56.52%)	.678	0.769 (0.223-2.654)
Signs of infection	13 (72.22%)	5 (21.74%)	.001	9 360 (2 239-39 121)
Fistula occlusion	3 (16.67%)	5 (21.74%)	.684	0.720 (0.147-3.520)
Adjunctive procedure	6 (33.33%)	7 (30.43%)	.843	1.143 (0.305-4.289)
Life-long antibiotics	8 (44.44%)	10 (43.48%)	.951	1.040 (0.300-3.603)
Post-op complications	17 (94.44%)	4 (17.39%)	.000	80.750 (8.203-794.944)
30-day mortality	3 (16.67%)	0 (0.00%)	.042	1.200 (0.976-1.475)

OR, odds ratio; CI, confidence interval; AEF, aortoenteric fistula; AA, abdominal aorta; TA, thoracic aorta.

#### Antoniou JVS 2009

### Recurrent or persistent infection or hemorrhage in 44% after 13 m.



OR, odds ratio; CI, confidence inte. ..., ....., userservere menun, ..., userservere menun, ..., userservere menun

#### Antoniou JVS 2009



Kakkos JEVT 2011

### **Review: EVR after AEF**



Number 47

at risk

Time (months)

Absent

Present

Perioperative sepsis

Kakkos JEVT 2011

### AEF after EVAR

20 cases described between 1999 and 2008
Etiology: infection? sac expansion? erosion?
Mortality: 40%





Saratzis JEVT 2008

### Conclusions

Endovascular sealing is an effective technique to stop bleeding from AEF
 Due to the high recurrence rate, this should be considered as a temporary solution

- All patients fit for open surgery should be treated accordingly as soon as possible
- The total mortality of the combined approach looks favorable in comparison to direct open repair in unstable patients