



# CASSIS

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[www.sres-symposium.org](http://www.sres-symposium.org)

Centre de congrès  
Oustau Calendal

26 & 27 septembre  
2024

## Anévrismes de l'aorte abdominale rompus à haut risque chirurgical

*P Desgranges,  
J Touma,  
J Senemaud,*

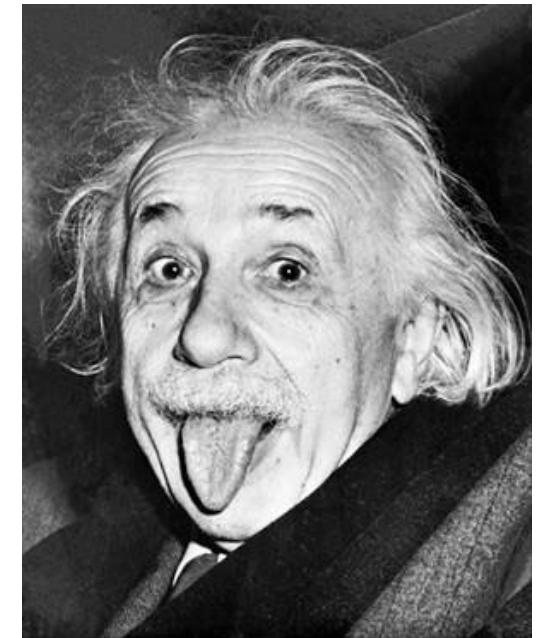
*H Kobeiter, V Tacher  
J Canonge, S Multon,  
M Majewski*

**Services d'Imagerie et de Chirurgie  
Vasculaire**  
**Hôpital Henri Mondor**

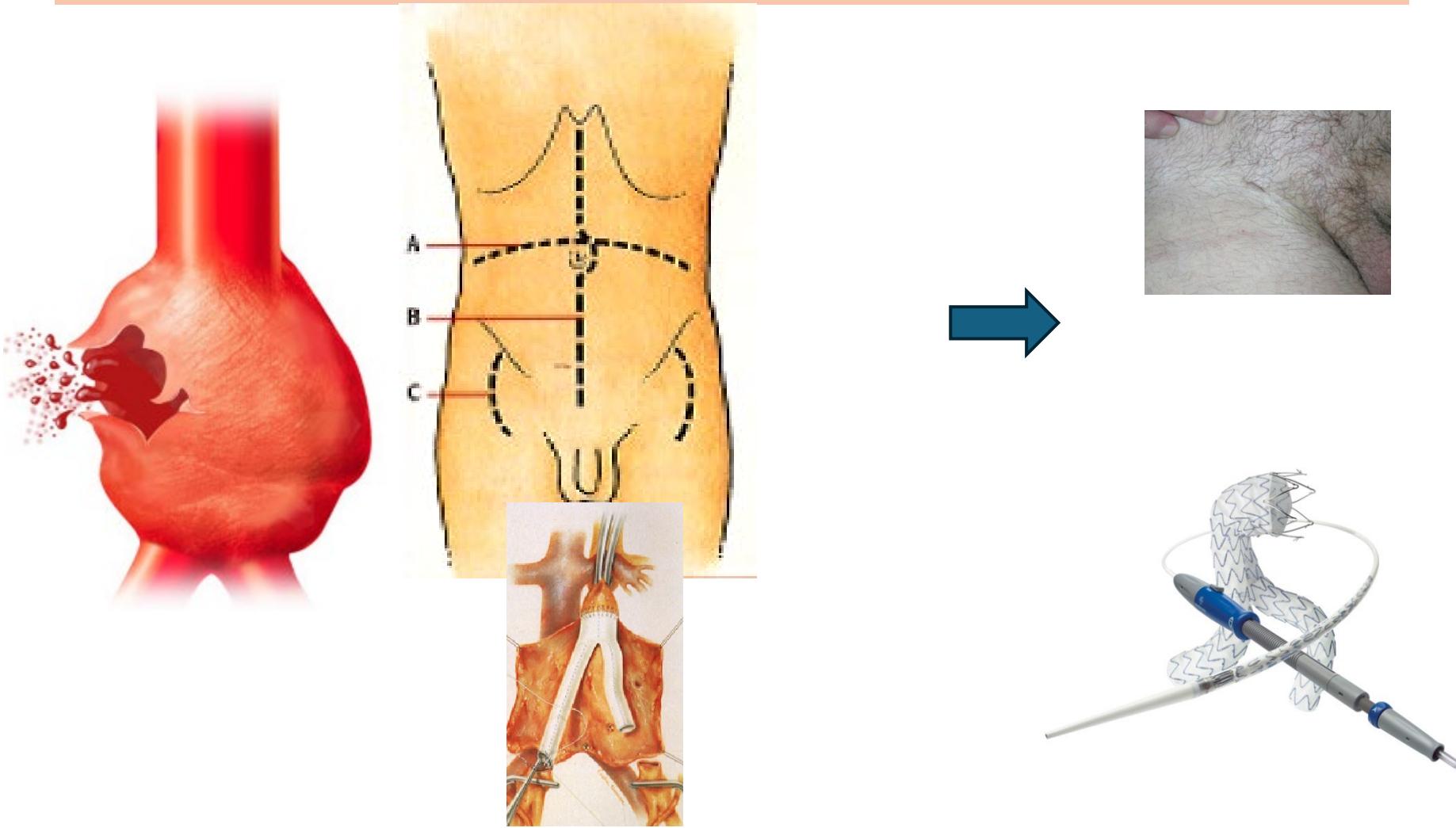


# AAA ROMPUS

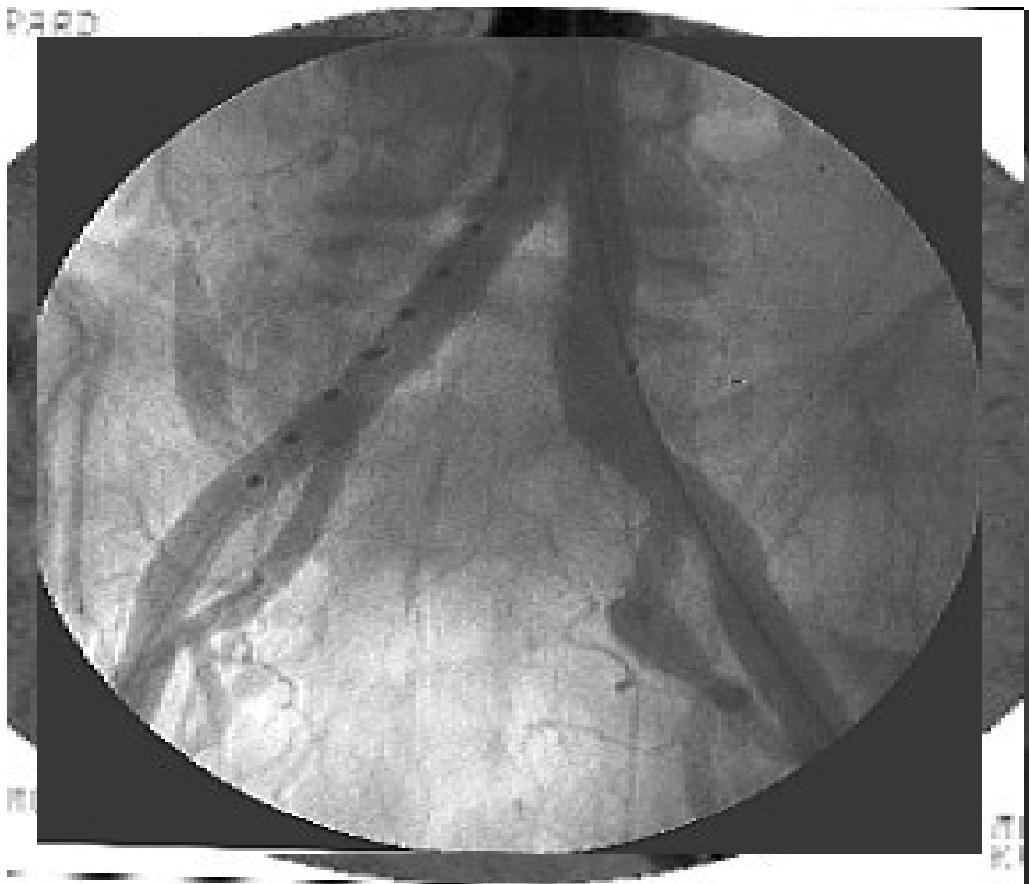
- Mortalité globale: 80-90%
- Mortalité chirurgicale (ouvert): 30-50%
  - Identique pendant 30/40 ans
- Incidence des AAA rompus:  
1970-80: 5.6 pour 100,000;  
2000: 10.6 pour 100,000.  
>2000: diminution



# Années 2000: apparition du traitement endovasculaire



# 2001 PREMIER CAS HM



10 ANS APRES...



# **PRISE EN CHARGE PRÉ-HOSPITALIÈRE=SOS Aorte Est**

Buts

- Amener le patient vivant à l'hôpital
- Avoir le temps de réaliser un scanner

Gestion du choc hémorragique

Ceinture antiG, délai +++

Scores prédictifs +/-

**Hypotension contrôlée: PAS entre 80 et 100 mmHg**

# **Scanner et hypotension Contrôlée**

- *JVS 2004:* faisabilité du scanner pré-op
  - Sur 56 patients refusant la chirurgie:
    - 87.5% décès > 2 h après l'admission.
    - Intervalle median entre admission et décès > 10h

**L'AAA rompu n'est pas une mort subite**

# **Conditions nécessaires pour le traitement endovasculaire des AAA rompus**

Scanner 24/24

Salle hybride 24/24

Stock d'EP

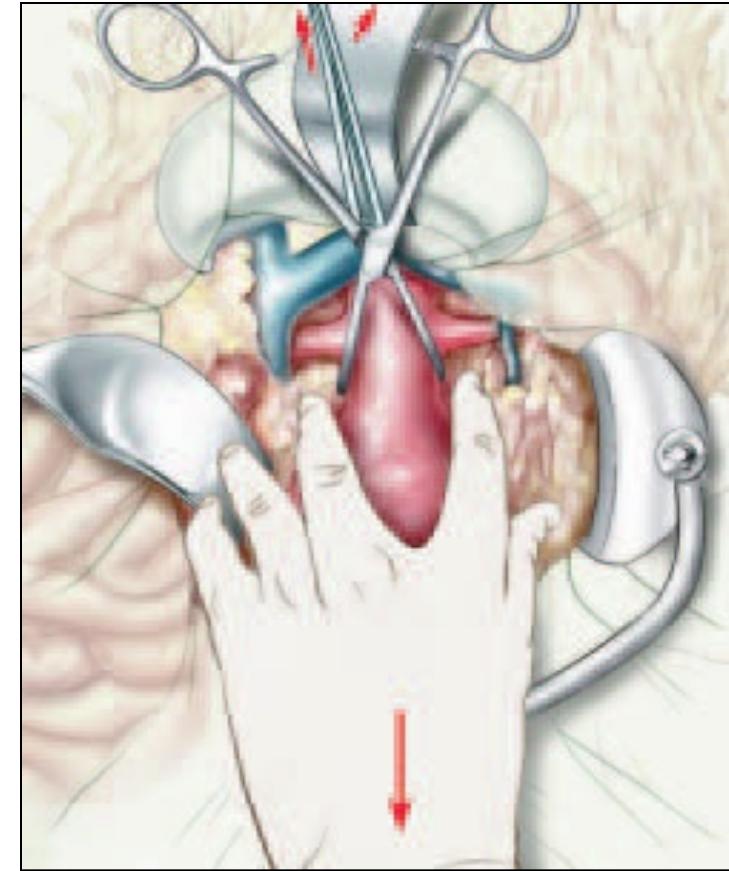
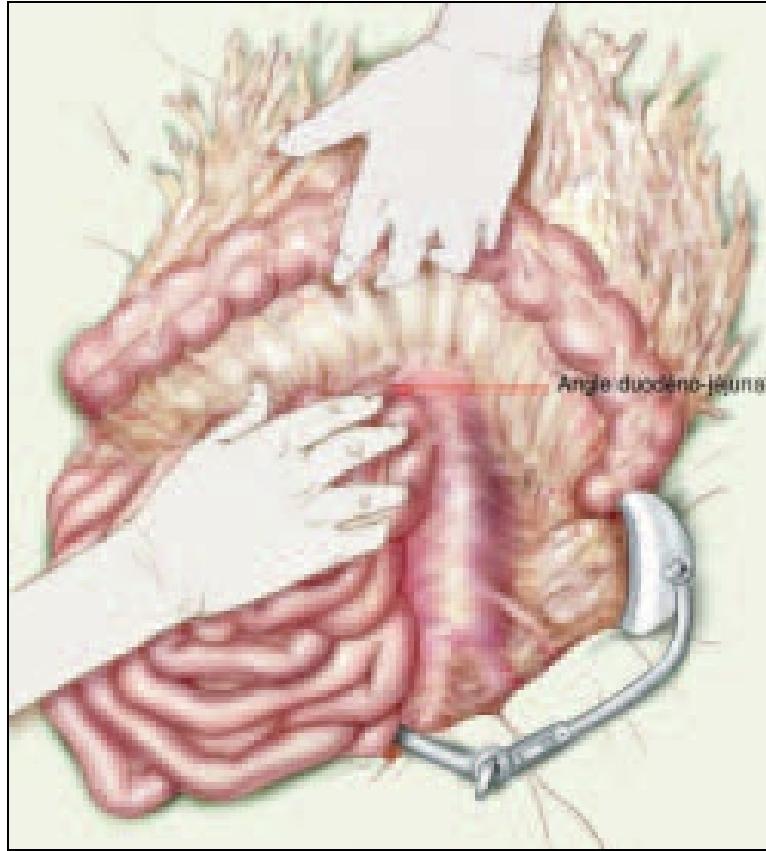
Staff médical et paramédical formés

Présence de deux séniors

.

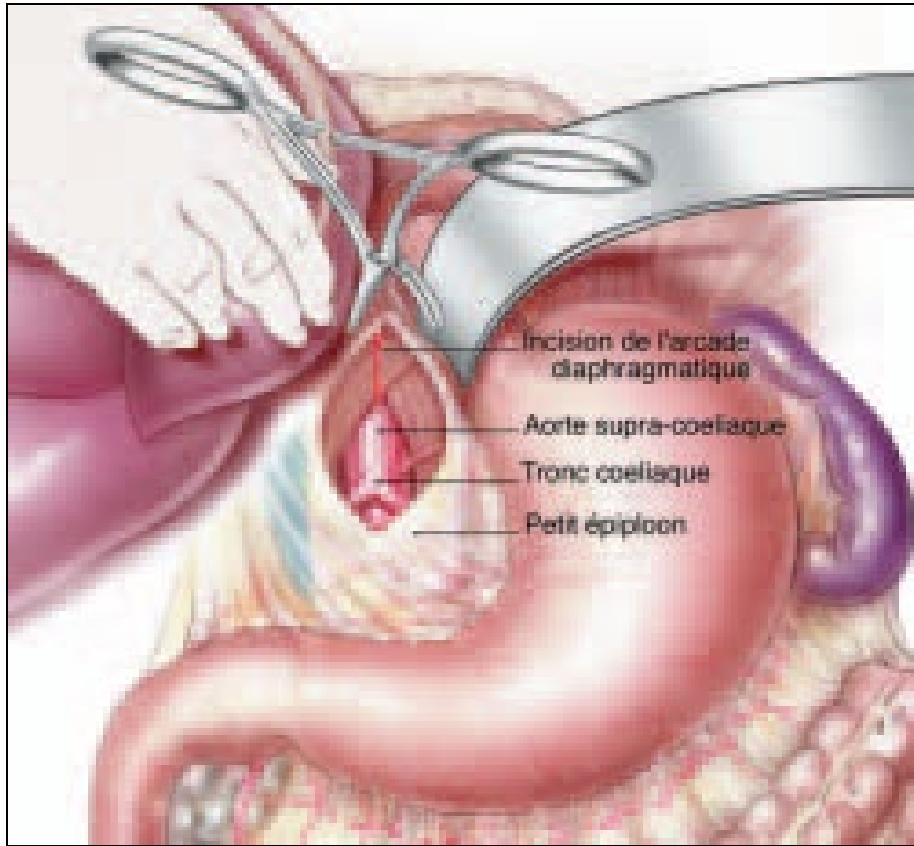
**Clampage chirurgical ou endovasculaire?**

# CLAMPAGE CHIRURGICAL

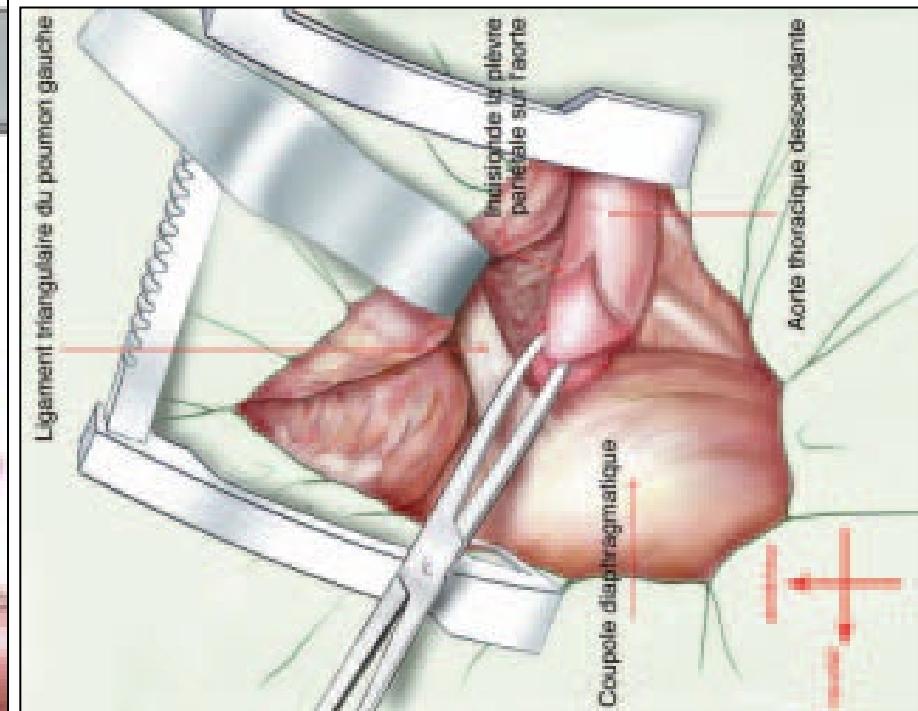


SOUS-RENAL

# CLAMPAGE CHIRURGICAL

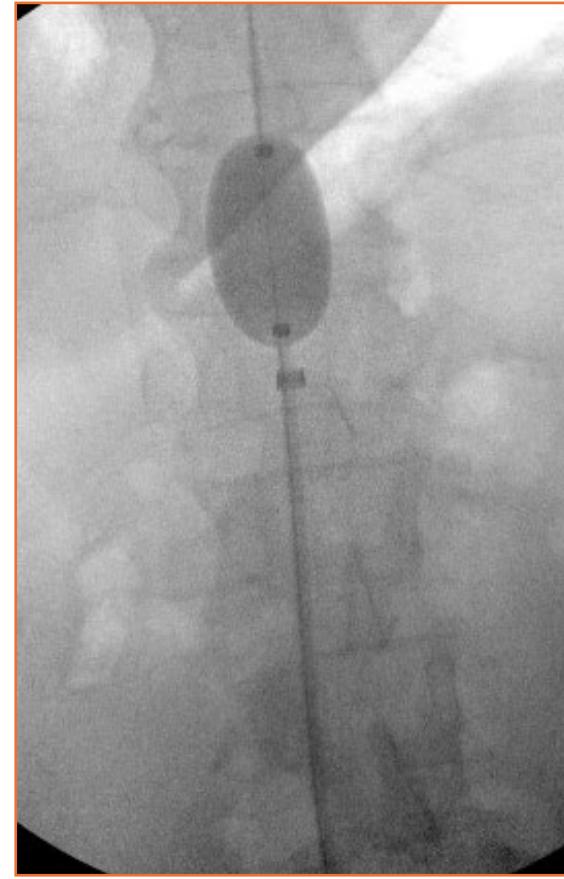
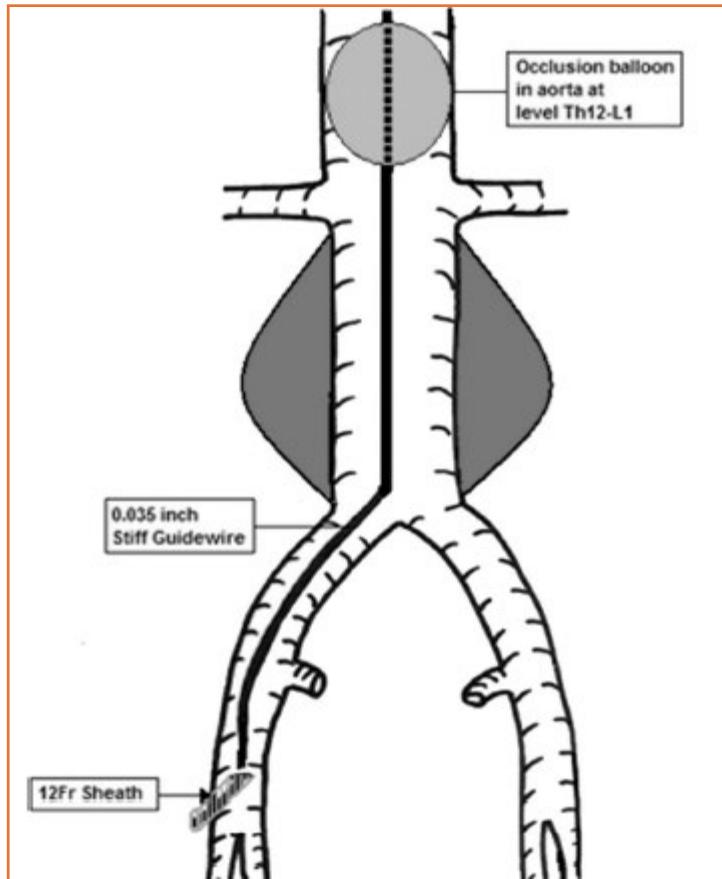


CAELIAQUE



THORACIQUE

# Ballon d'endoclampage-REBOA



# **REBOA-Ballon d'endoclampage**



## **Avantages**

Stoppe l'hémorragie rapidement

Réduit l'hématome rétropéritonéal

Prévient le sd compartmental

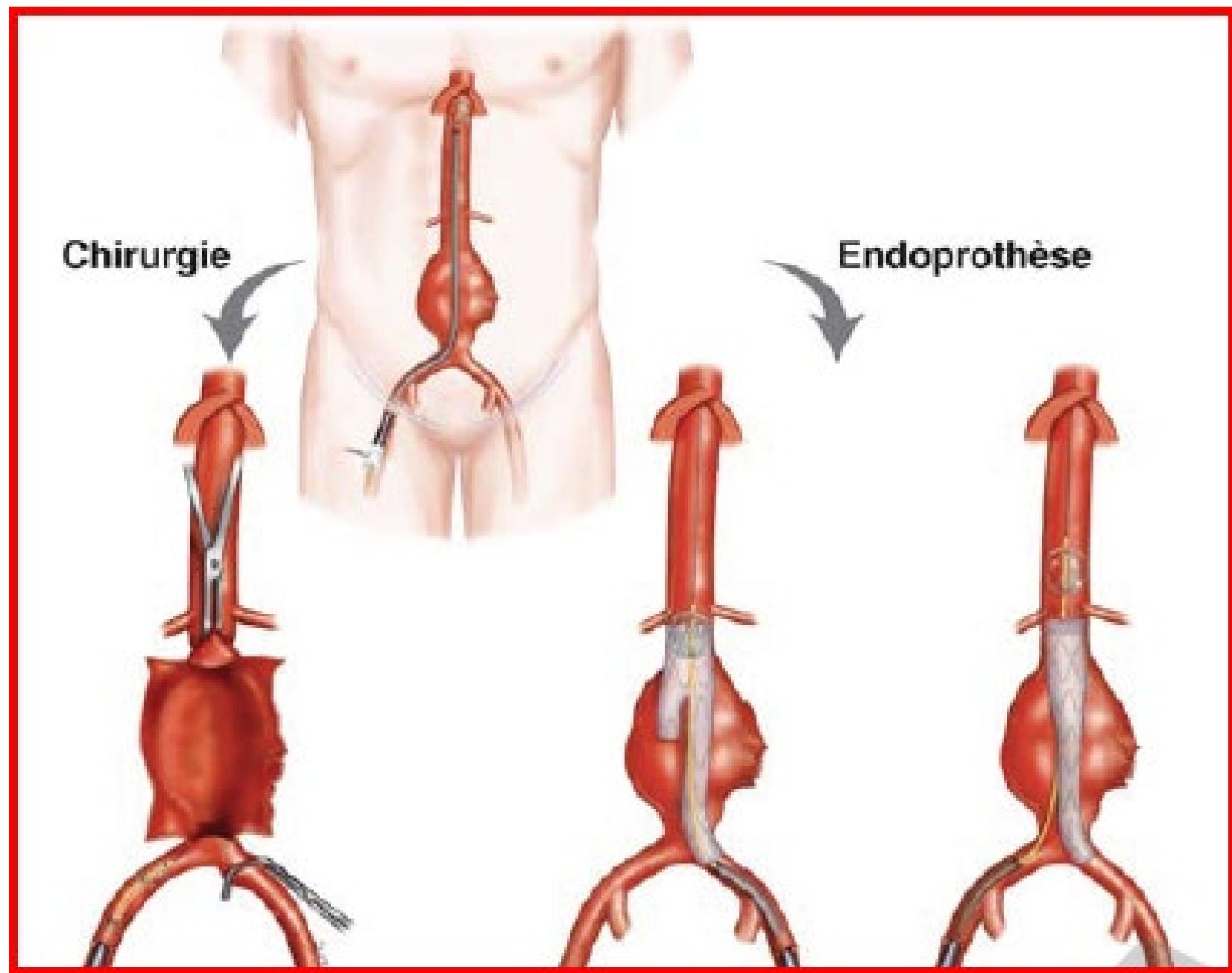
Réduction des dommages collatéraux

Mise en place avant l'AG

## **Inconvénients**

Embolies et ischémie viscérale

Rupture aortique/iliaque



# Etudes REVAR retrospectives

- Résultats en faveur EVAR : 24 % mortalité versus 38 %
- **MAIS:** Séries courtes, rétrospectives
- Comparaison à séries historiques
- Groupes pré-selectionnés: bcp de candidats à la chir n'aurait pas été de bons candidats pour l'EVAR (morphologie, hémodynamique instable)

# Etudes REVAR randomisées

Eur J Vasc Endovasc Surg (2015) 50, 303–310

ECAR



**Editor's Choice — ECAR (Endovasculaire ou Chirurgie dans les Anévrismes aorto-iliaques Rompus): A French Randomized Controlled Trial of Endovascular Versus Open Surgical Repair of Ruptured Aorto-iliac Aneurysms**

P. Desgranges <sup>a,\*</sup>, H. Koblenter <sup>b</sup>, S. Katsahian <sup>c</sup>, M. Bouffi <sup>d</sup>, P. Gouny <sup>e</sup>, J.-P. Favre <sup>f</sup>, J.M. Alsac <sup>g</sup>, J. Sobocinski <sup>h</sup>, P. Julia <sup>i</sup>, Y. Alimi <sup>j</sup>, E. Steinmetz <sup>k</sup>, S. Haulon <sup>b</sup>, P. Alric <sup>j</sup>, L. Canaud <sup>j</sup>, Y. Castier <sup>k</sup>, E. Jean-Baptiste <sup>j</sup>, R. Hassen-Khodja <sup>j</sup>, P. Lermusiaux <sup>m</sup>, P. Feugier <sup>m</sup>, L. Destrieux-Garnier <sup>n</sup>, A. Charles-Nelson <sup>j</sup>, J. Marzelle <sup>j</sup>, M. Majewski <sup>j</sup>, A. Bourmaud <sup>j</sup>, J.-P. Bécquemin <sup>j</sup>, the ECAR Investigators

IMPROVE



AJAX



## ECAR RESULTATS @ 30 j

	OSR	EVAR	p
<b>Mortalité</b>	<b>24%</b>	<b>18 %</b>	<b>ns</b>

## RESULTATS @ 1 an

	OSR	EVAR	p
<b>Mortalité</b>	<b>35%</b>	<b>30 %</b>	<b>ns</b>

# EVAR > OSR

	OSR	EVAR	P value
<b>Total ventilation</b>	<b>180.3 h</b>	<b>59.3 h</b>	<b>0.007</b>
<b>Pulmonary complications</b>	<b>58.6 %</b>	<b>15.4%</b>	<b>0.005</b>
<b>Post-op dialysis</b>	<b>12.2 %</b>	<b>1.9 %</b>	<b>0.08</b>
<b>Abnormal colonoscopy</b>	<b>19.2%</b>	<b>10.9%</b>	<b>0,05</b>
<b>Total blood transfusion</b>	<b>10.9</b>	<b>6.8</b>	<b>0,02</b>
<b>Duration in ICU</b>	<b>11.9</b>	<b>7</b>	<b>0,01</b>

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<b>Abnormal colonoscopy</b>	<b>19.2%</b>	<b>11.9%</b>	<b>0.06</b>
<b>Total blood transfusion</b>	<b>10.9</b>	<b>6.8</b>	<b>0.02</b>
<b>Duration in ICU</b>	<b>11.9</b>	<b>7</b>	<b>0.01</b>

# CONCLUSIONS ECAR

- ✓ ECAR mortalité : EVAR = OSR
- ✓ EVAR est associée à des complications moins sévères et une consommation moindre des ressources hospitalières

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# Résultats méta-analyse/Mortalité

ECAR



=

IMPROVE



=

AJAX



SYSTEMATIC REVIEW

Meta-Analysis and Meta-Regression Analysis of Outcomes of Endovascular and Open Repair for Ruptured Abdominal Aortic Aneurysm

Nikolaos Kontopoulos <sup>a</sup>, Nikolaos Galanakis <sup>b</sup>, Stavros A. Antoniou <sup>c</sup>, Dimitrios Tsetis <sup>b</sup>, Christos V. Ioannou <sup>a</sup>, Frank J. Veith <sup>d,e,f</sup>, Janet T. Powell <sup>f</sup>, George A. Antoniou <sup>d,h,i</sup>

Br J Surg, 102 (2015), pp. 1229-1239



interpretation decevante...



# Mais...

- Meta analysis: 

⇒ Sortie +rapide EVAR > OSR

⇒ EVAR meilleure pour les femmes

⇒ Chir : mortalité diminue si collet augmente



- ECAR :

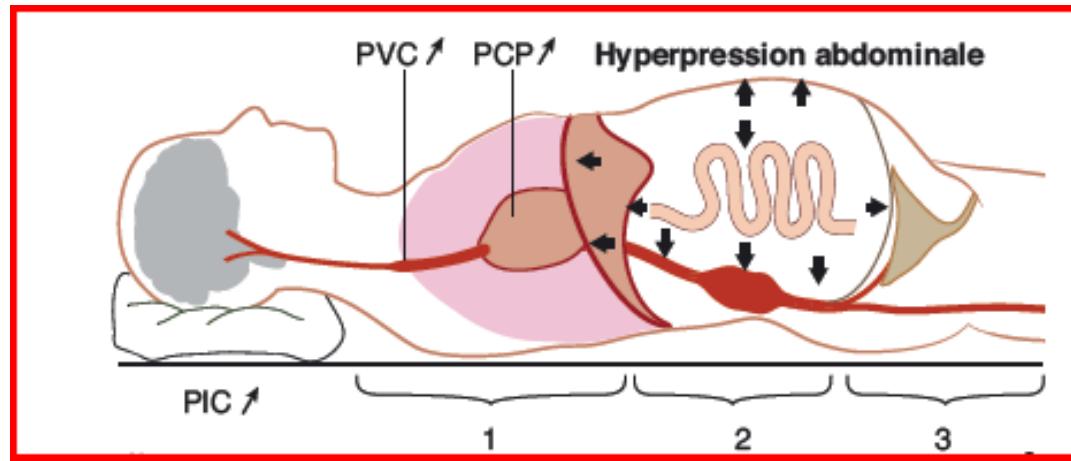
EVAR coute moins que la chirurgie



# **Voies d'amélioration possibles**

- 1-Hypotension contrôlée
- 2- Gestion du syndrome compartimental abdominal
- 3- Gestion du collet court:
  - Technique de la cheminée +
  - Fenestration laser +++

# Syndrome compartmental abdominal

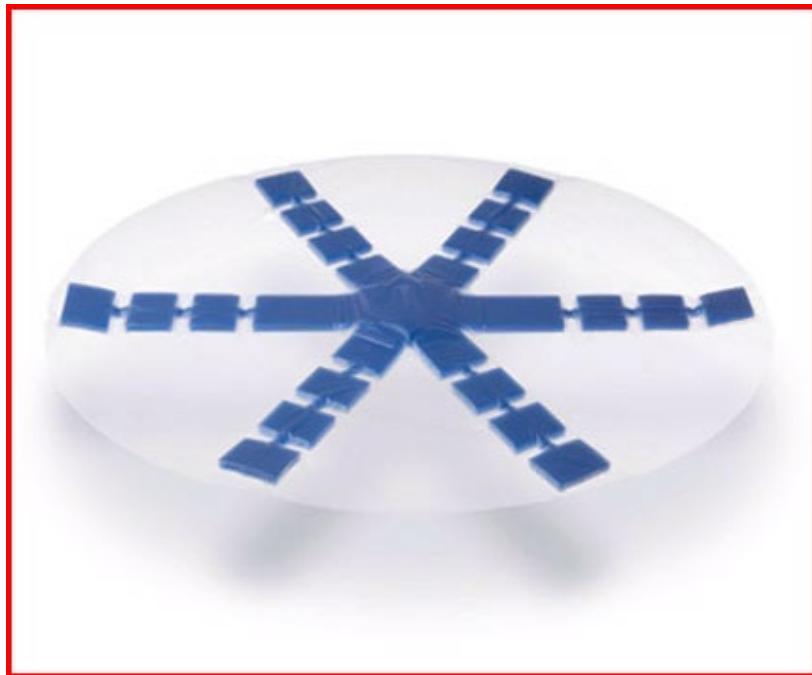


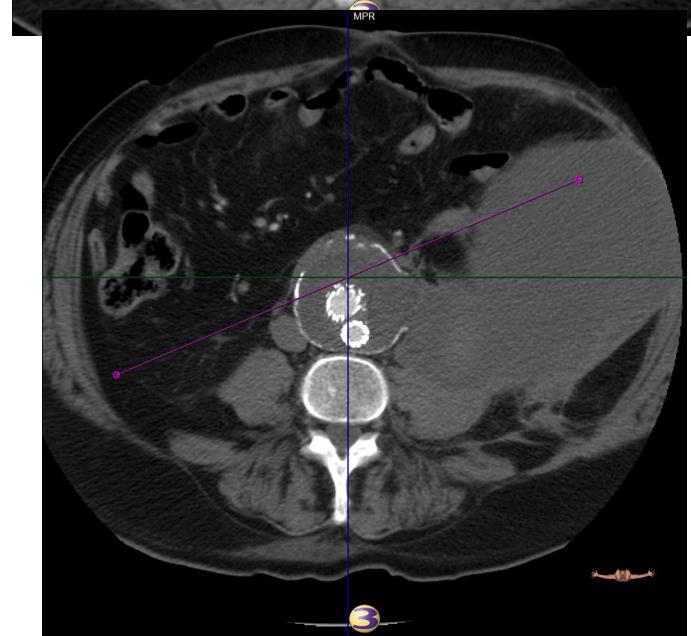
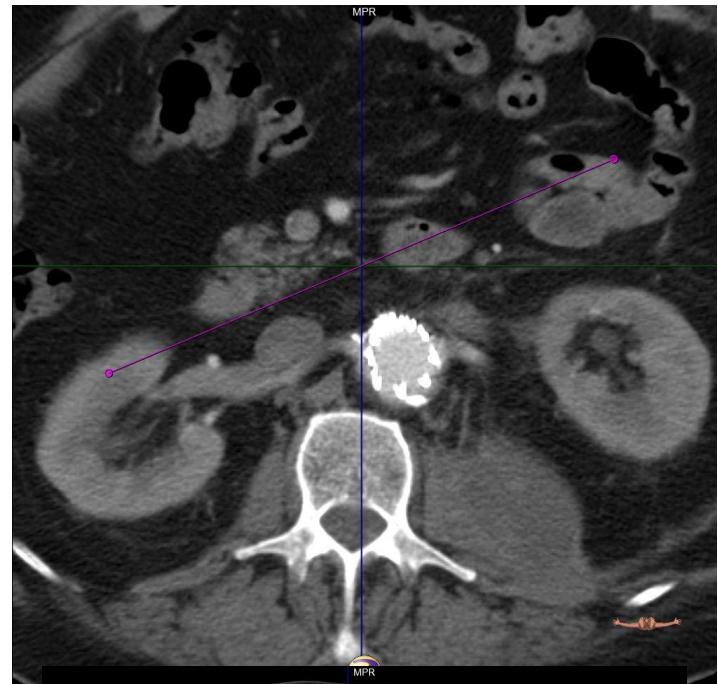
Pression intravésicale >20 mmHg et 1 défaillance d'organe

**Incidence: 20% après REVAR**



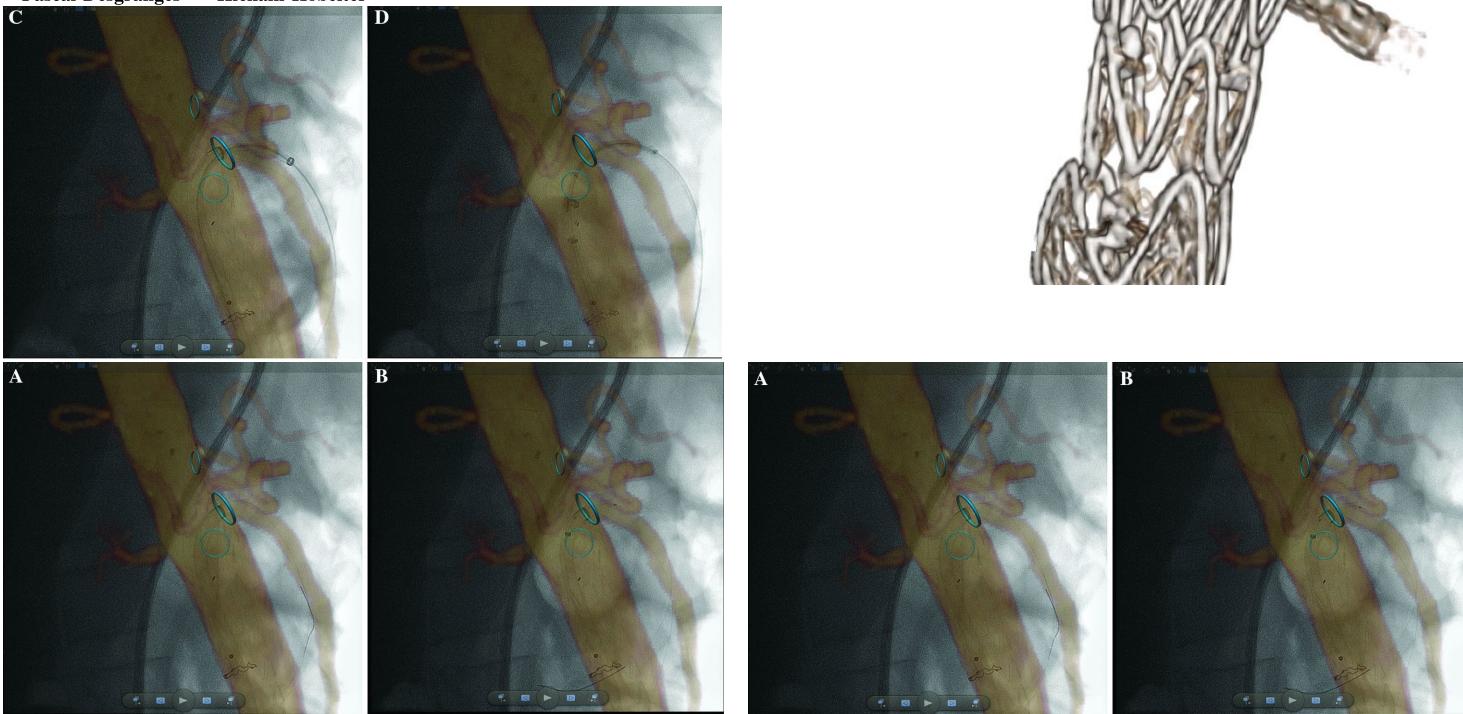
## VAC ABDO (ABThera ®)

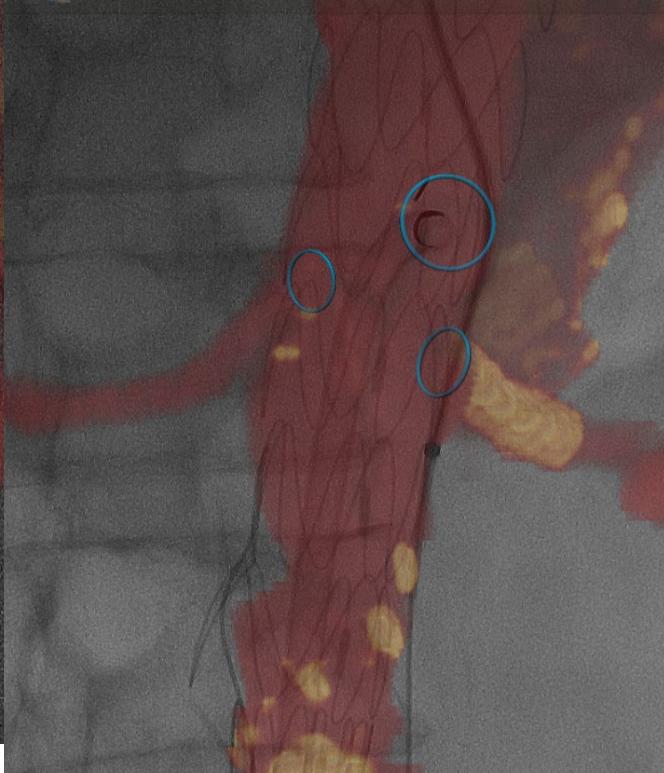


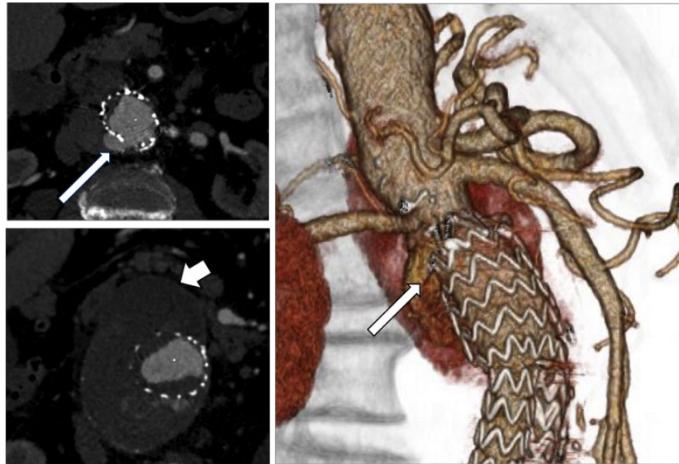


## Image Fusion Guidance for In Situ Laser Fenestration of Aortic Stent graft for Endovascular Repair of Complex Aortic Aneurysm: Feasibility, Efficacy and Overall Functional Success

Thomas Leger<sup>1</sup> · Vania Tacher<sup>1,2,3</sup>  · Marek Majewski<sup>4</sup> · Joseph Touma<sup>4</sup> ·  
Pascal Desgranges<sup>2,4</sup> · Hicham Koebele<sup>1,2</sup>





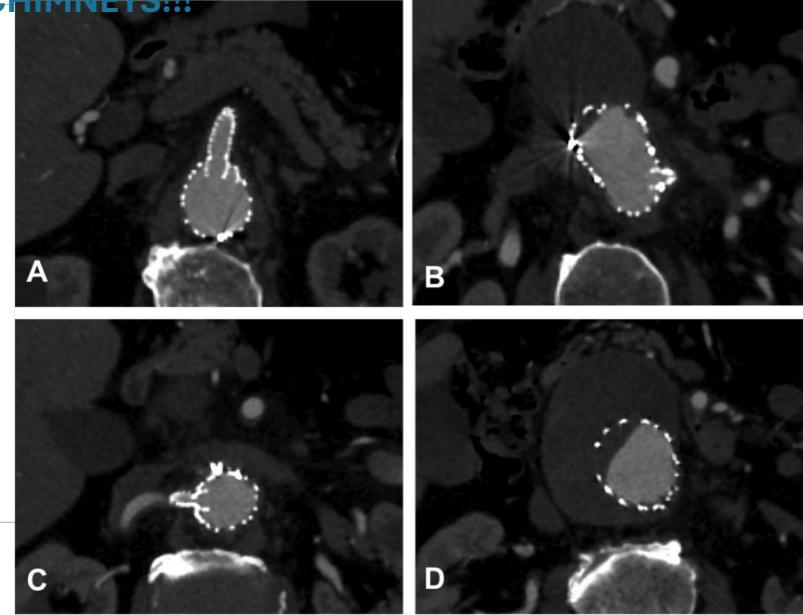
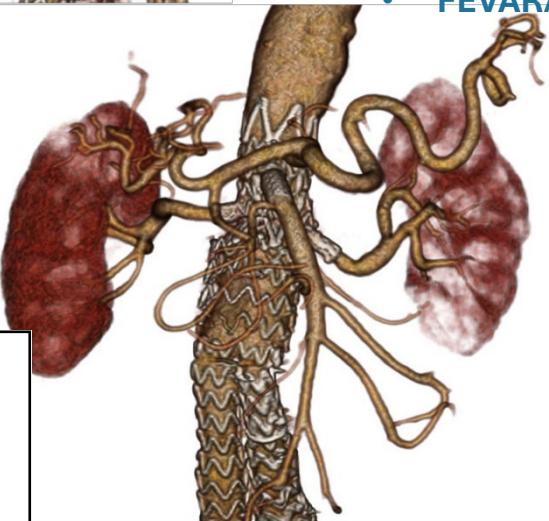


Triple antegrade in situ laser fenestration of aortic stent-graft with fusion imaging for urgent treatment of symptomatic abdominal aneurysm in the presence of type 1 endoleak

Joseph TOUMA, Hicham KOBEITER, Marek MAJEWSKI, Vania TACHER, Pascal DESGRANGES  
Accepted CVIR 2017

### Unsuitable for standard EVAR

- **Rapid enlargement / symptomatic**
- **Large AAA > 65 mm**
- **Emergent situations (post-EVAR type IA EL...)**
- **Contra-Indications for open surgery**
- **FEVAR/CHIMNEYS!!!**

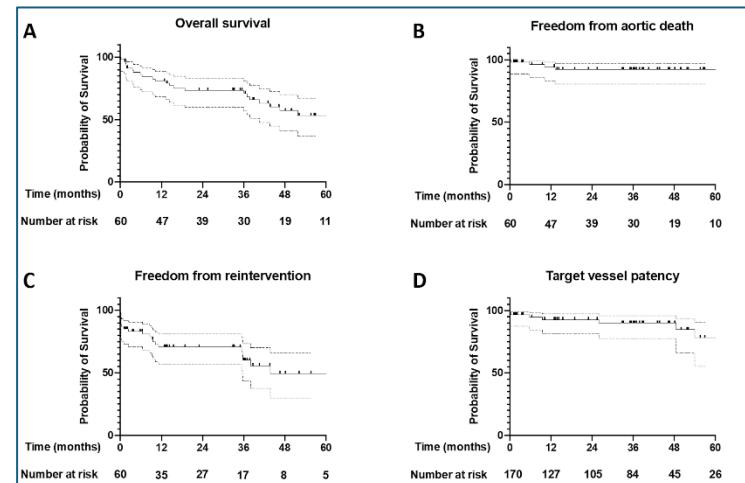


# LEVAR: Mid-term FU (3 Years)

- 60 LEVAR (The median follow was 37 months).
- Painful aneurysms. 18% (n = 12)
- Enlarging aneurysms > 65 mm 55% (n = 33),
- Anatomical constrains 23% (n = 14)
- **One rupture**

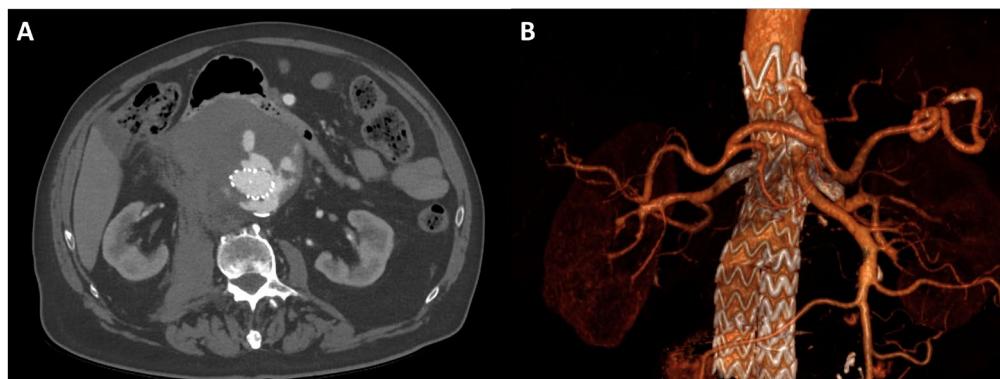
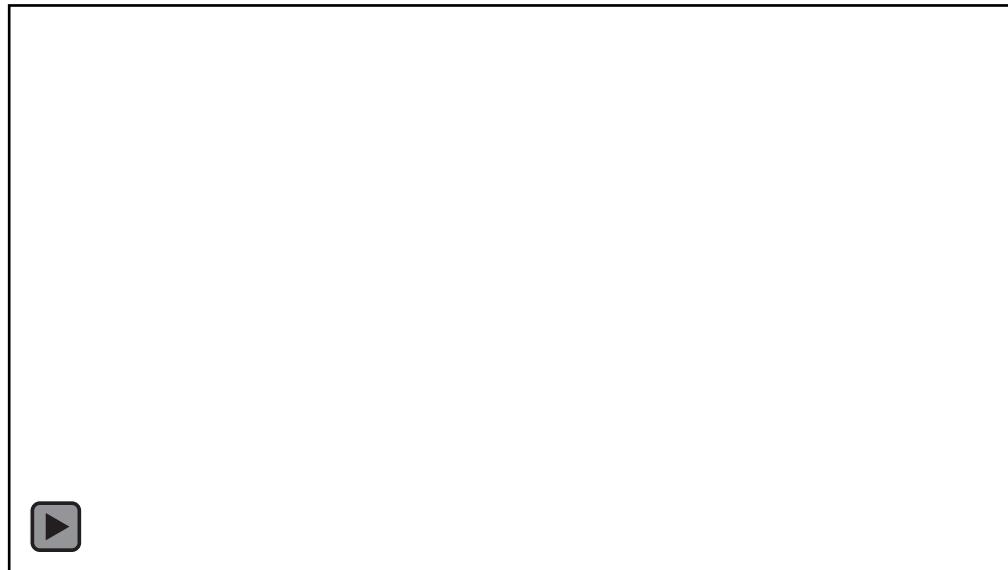
- The median diameter of aortic aneurysms was 65.5 mm (IQR 13).
- 170 antegrade laser fenestrations were performed (mean 2.8 per patient).
- Technical success 98% of cases.
- The in-hospital mortality rate was 5% (n = 3).
- Overall survival and freedom from reintervention at three years were respectively 81% (CI95%: 68.3-89) and 60.2% (CI95% 43.4-73.4).
- A three-year target vessel patency rate of 90.1% (CI95% 77.5-95.8).
- The three-year freedom from aortic death estimate was 98% (CI95% 86.9-99.7).

Iodinated contrast volume (mL)	80 [59;113]
X-ray exposure (Gy.cm <sup>2</sup> )	338 [259;495]
Median ischemic time per artery (min)	
Superior mesenteric artery	34 [25;43]
Left renal artery	69 [56;83]
Right renal artery	73 [36;102]
Celiac trunk	93 [89;96]

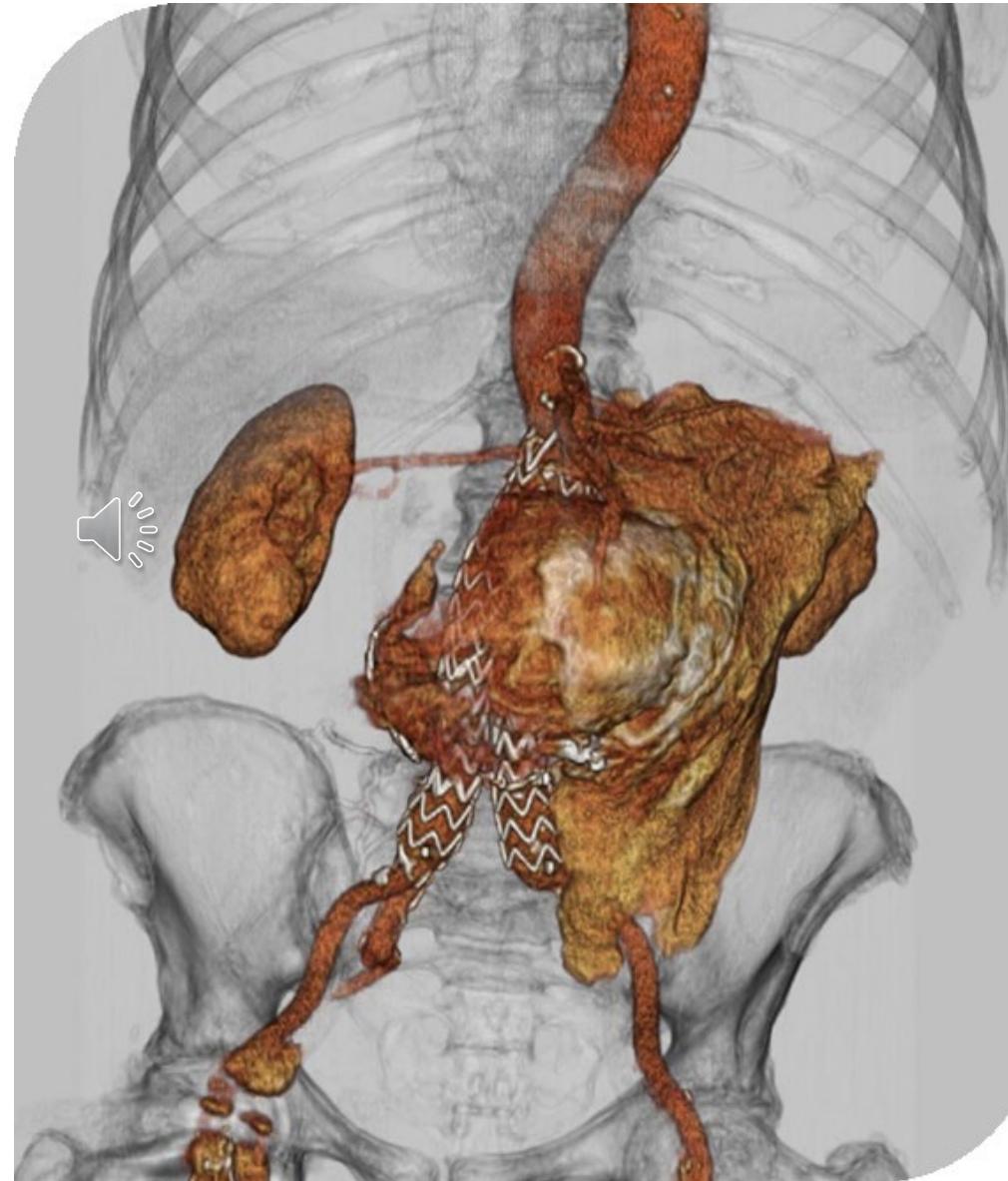
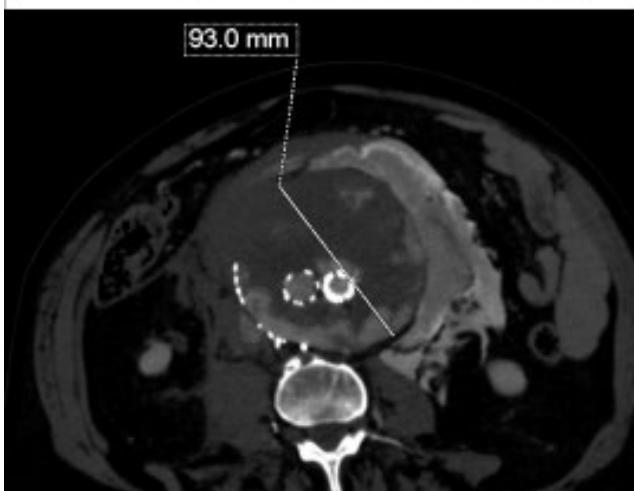
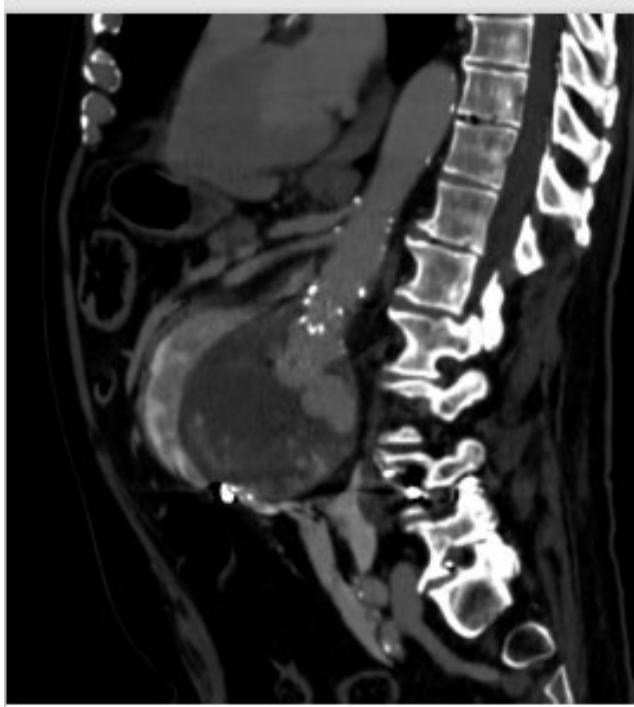


# Ruptured AAA

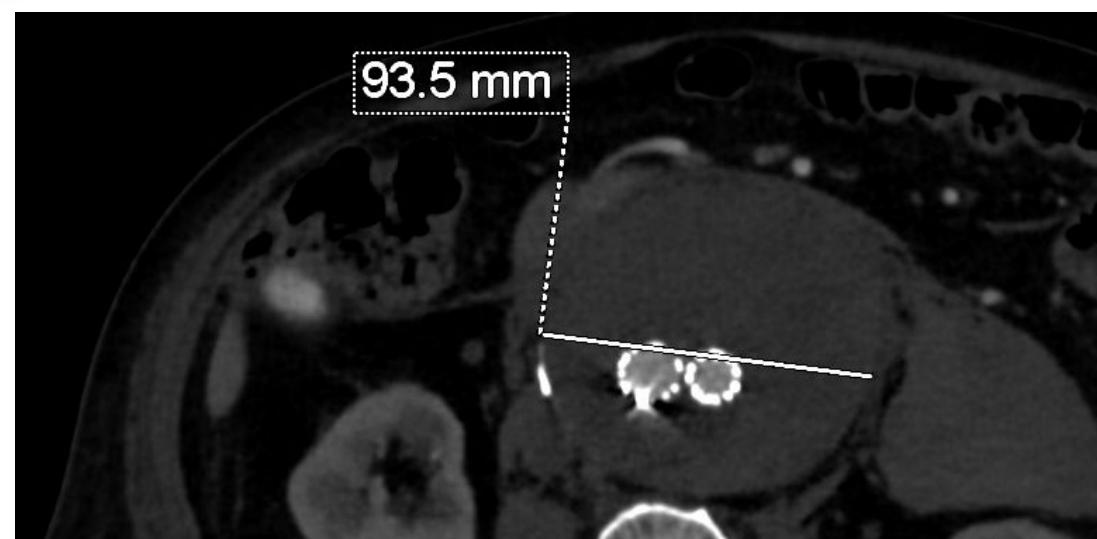
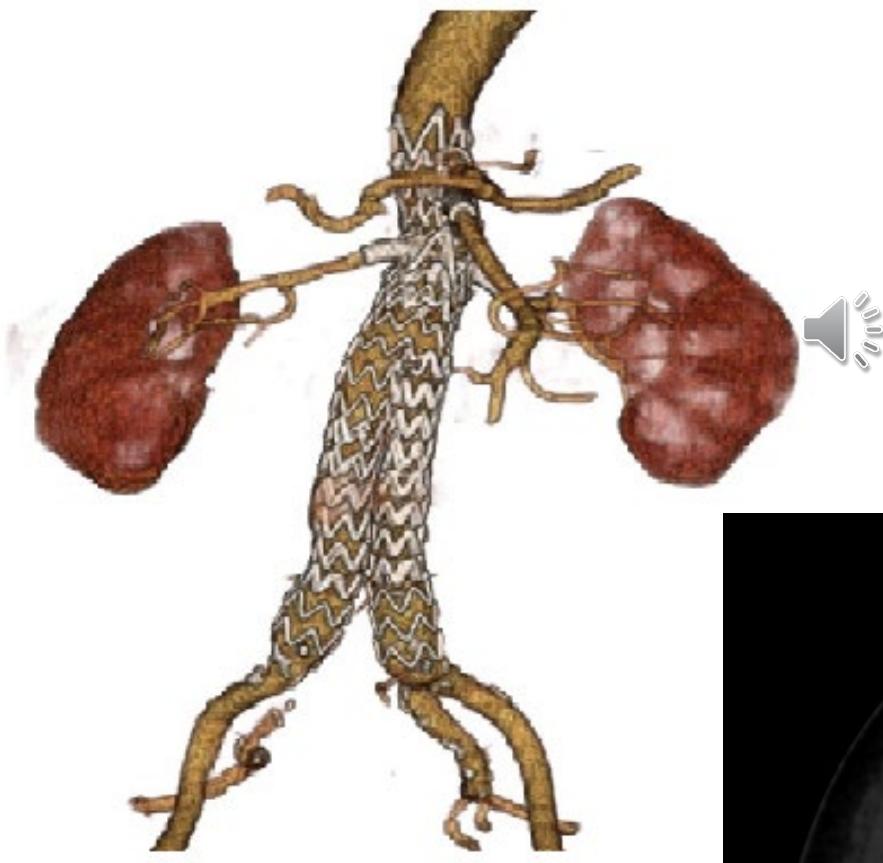
- Man 86 Year old
- EVAR: 2012
- Referred for a type II endoleak (2 embolizations attempted) and sac enlargement “86mm”
- Type Ia after reviewing the files: 2022
- Recused by anesthesiologist for surgical repair
- Complex EVAR planned after myocardial scintigraphy (with effort test)
- Abdominal pain while leaving Nuclear medicine department → CT-scanTime
- from REBOA positioning to aortic extension deployment was 50 minutes.
- Additional 21 min were needed to the covered stent deployment inside the SMA, with a total ischemic time of 71 minutes for the SMA
- additional 31 and 19 min were needed for the right and left renal arteries' covered stents deployment, respectively.



# Anévrysme rompu



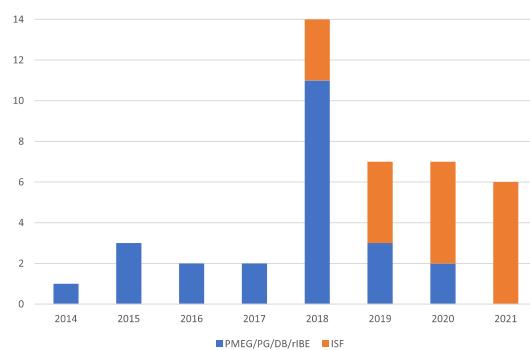
**Suivi= OK**



The custom-made fenestration performed the highest results in terms of the radial and branch pull-out strength. both PMSG and ISF techniques provide an interesting alternative.

## Comparative early results of in situ fenestrated endovascular aortic repair and other emergent complex endovascular aortic repair techniques for ruptured suprarenal and thoracoabdominal aortic aneurysms at a regional aortic center

Alyssa J. Pyun, MD, Helen A. Potter, MD, Gregory A. Magee, MD, MSc, Miguel F. Manzur, MD, Fred A. Weaver, MD, MMM, Kenneth R. Ziegler, MD, Jacquelyn K. Paige, MSN, NP, and Sukgu M. Han, MD, MS, Los Angeles, CA



**Mortality:** in-hospital mortality trended lower in the ISF group (11% vs 25%,  $P < .233$ ) reaching statistical significance when comparing patients who presented with hypotension (8% vs 45%,  $P < .048$ )

Journal of Vascular Surgery  
October 2022

## Integration of a Custom-Made Fenestration to Simplify Acute Reno-Visceral In Situ Aortic Repair

Marton Berczeli <sup>1 2</sup>, Björn Sonesson <sup>1 3</sup>, Angelos Karelis <sup>1 3</sup>, Gustavo S Oderich <sup>4</sup>, Nuno V Dias <sup>1 3</sup>

Two sizes of a single-fenestrated aortic stentgraft cover >90% of juxtarenal and pararenal AAA. May facilitates the treatment by removing the ischemia time for the SMA and reducing the ischemia time for the celiac and renal arteries

# Conclusion :



## \* Advantages of LEVAR

- Feasible in emergent/bail-out cases /Narrow distal
- Less restrictions /FEVAR.
- Standard endoprostheses
- Faster and simpler /FEVAR?

## \* Limits of LEVAR: - Durability

Results are sustainable at 3 Y