

AVENICE 2015 ARRHYTHMIAS

Venice, Italy. October 16-18 2015

14th Edition

Technical option of percutaneous approach for trouble-shooting

Luca Segreti, MD

University Hospital of Pisa, Italy

Director M. G. Bongiorni

13.00-14.30

Scientific Societies Corner

JHRS Corner

Program Chairmen: Yuji Nakazato – Ken Okumura

**DEVICE AND LEAD TROUBLE-SHOOTING -
STANDARD STRATEGY AND TECHNICAL OPTION**

Chairmen: J.C. Daubert / Rennes, France - Y. Nakazato /
Tokyo, Japan

Standard strategy and limitation of device upgrade. C.
Suga / Saitama, Japan

Standard strategy and limitation of percutaneous lead
extraction. R.G. Carrillo / Miami, USA

Technical option of percutaneous approach for trouble-
shooting. L. Segreti / Pisa, Italy

Technical option of surgical approach for trouble-
shooting. K. Imai / Hiroshima, Japan

Sunday 18 - Cipressi Room



DISCLOSURE

- No disclosure





Trouble-shooting in Transvenous Lead Extraction



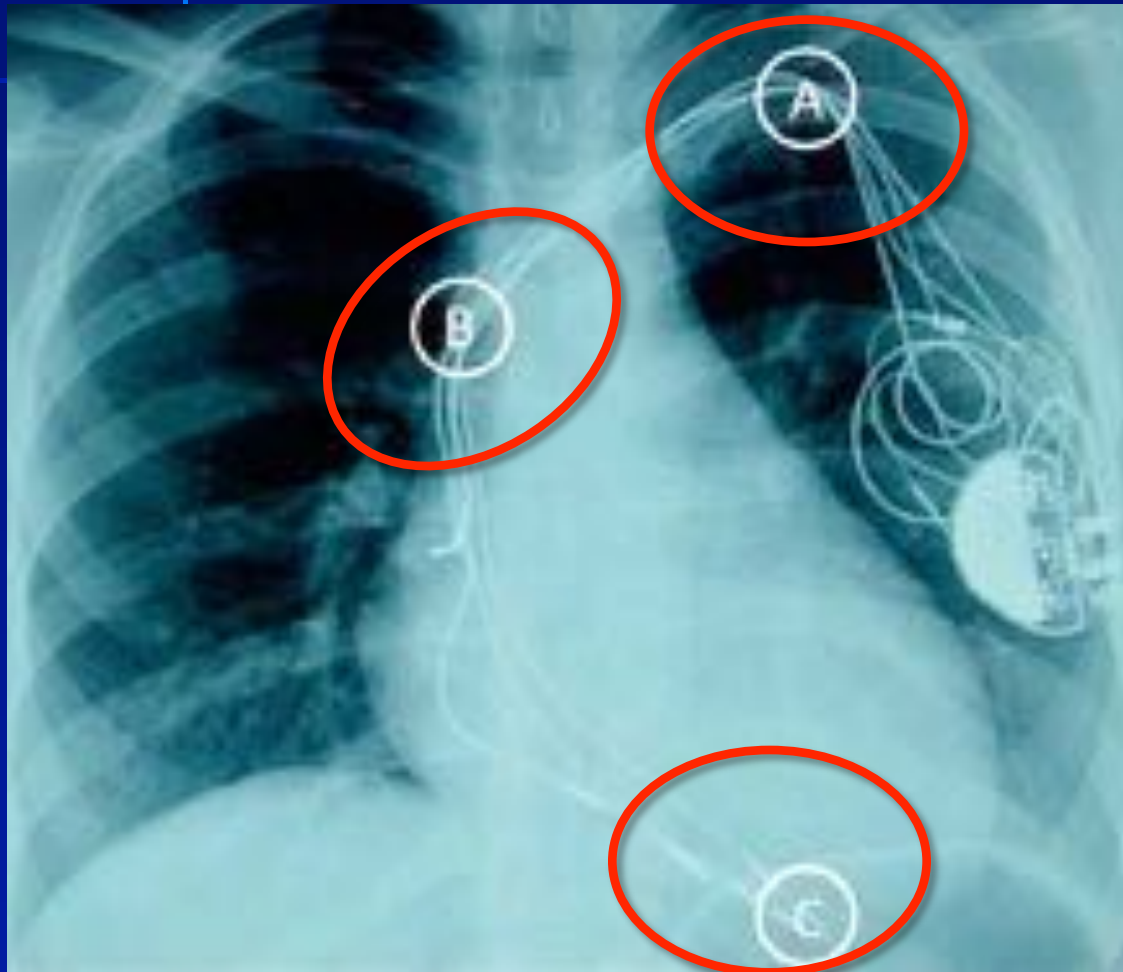
Trouble-shooting Definition

The screenshot shows the Wikipedia article for 'Troubleshooting'. At the top right, there are links for 'Create account', 'Not logged in', 'Talk', 'Contributions', and 'Log in'. Below these are tabs for 'Article' and 'Talk', and buttons for 'Read', 'Edit', and 'View history'. A search bar is also present. The main heading is 'Troubleshooting', followed by the text 'From Wikipedia, the free encyclopedia'. A prominent yellow box with a book icon and a question mark contains the text: 'This article needs additional citations for verification. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed. (June 2010)'. Below this, the first sentence of the article is: 'Troubleshooting is a form of problem solving, often applied to repair failed products or processes. It is

“a form of problem solving, applied to repair failed processes”



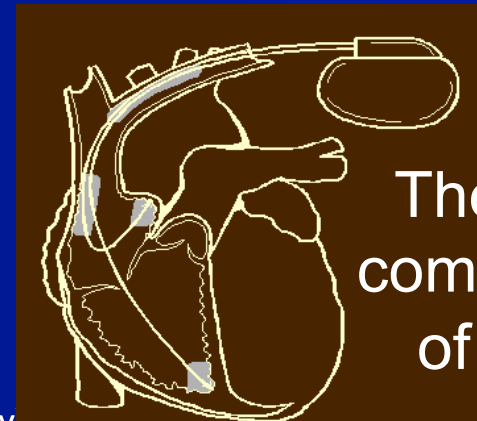
Sheath Application: Three Difficult Areas



Costo-Clavicular Entrance

Innominate/SVC junction

Lead tip



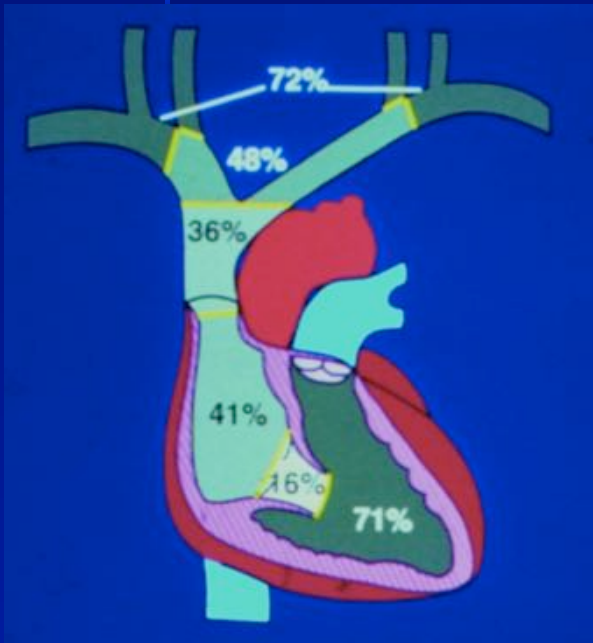
The 3 most common sites of fibrosis





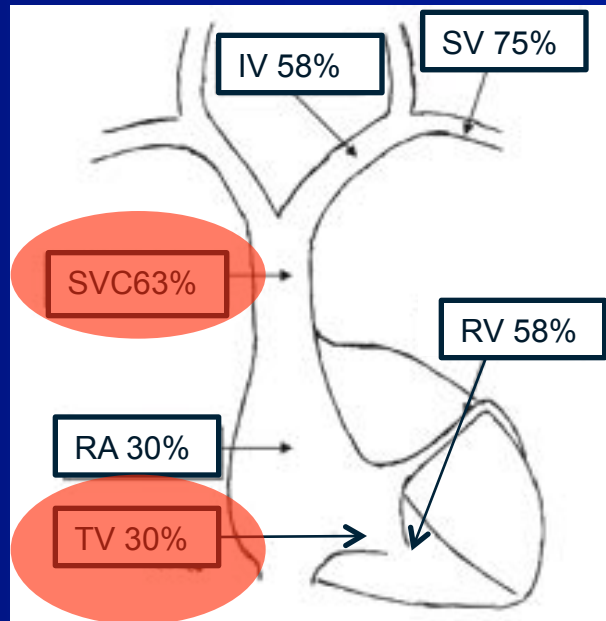
Fibrotic Reaction --> Difficult Extraction

SCAR TISSUE LOCATIONS:



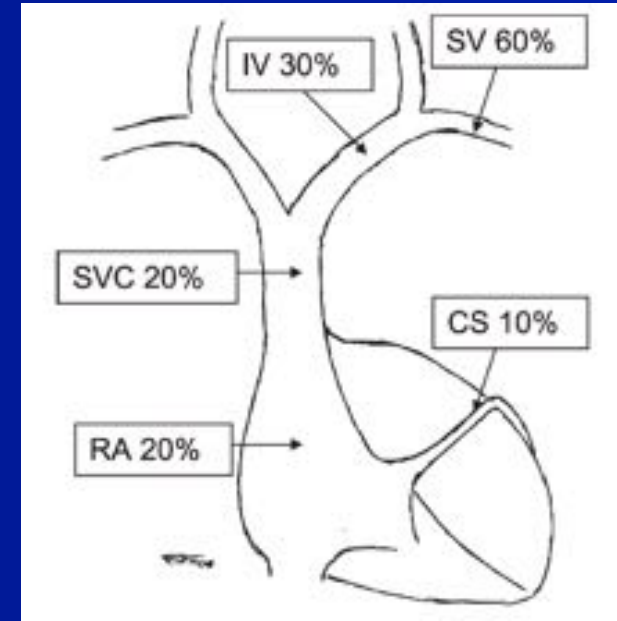
PACING LEADS

Byrd C,
extraction database



ICD LEADS

Segreti L,
Heart Rhythm 2010:5S,185



CS LEADS

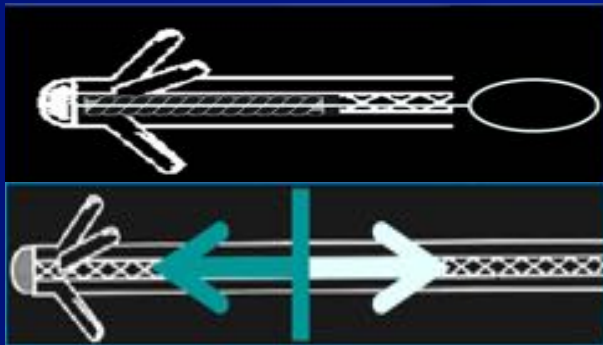
Bongiorni MG,
Europace 2007: 9, 69-73



Venous Entry Approach

■ Lead Preparation

– Tensile Strength

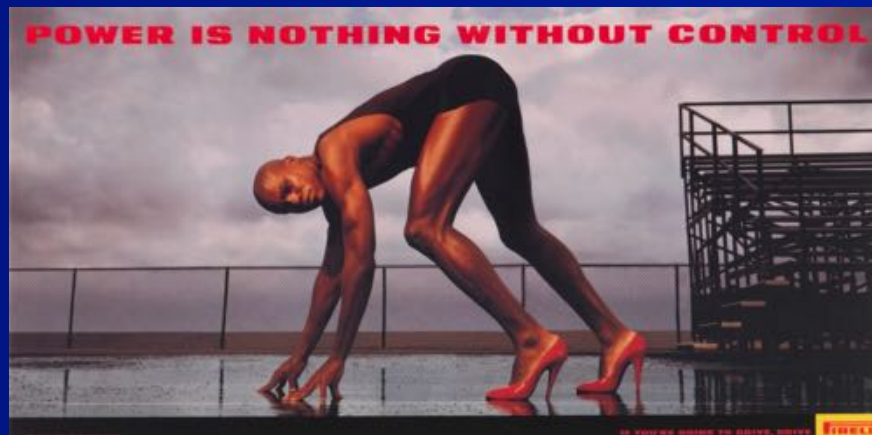


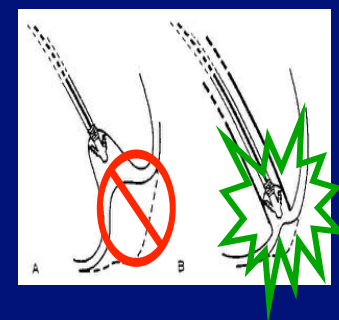
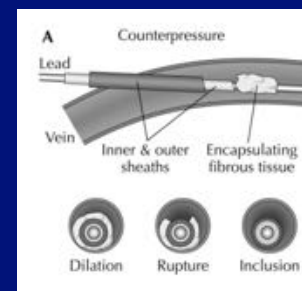
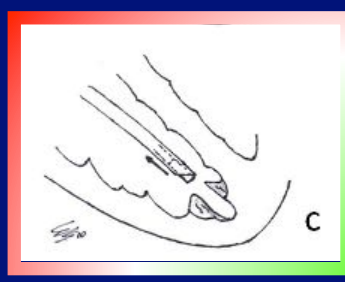
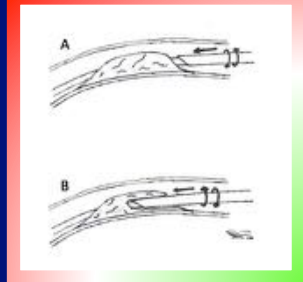
■ Sheath Application

– Rail Effect



Lead Control





Lead Control

- The appropriate equilibrium between pressure and traction forces.
- Allow forces application uniformly over the entire length of the lead.
- Imbalance between these forces can produce Failures or Complications.
- Lead control is important for improving success rate and reducing complications.



Segreti L et al in Transvenous lead Extraction, MG Bongiorno Editor, 2011

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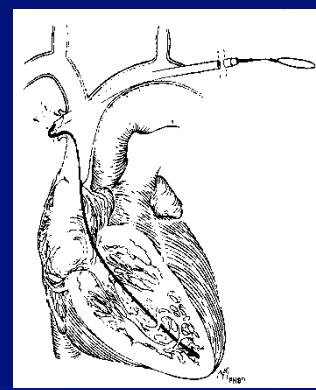


Three difficult Situations

- Difficult Sheath Advancement
- Lead Damage
- Free-floating Leads



Difficult Sheath Advancement



PROBLEM

Narrow costo-clavicular Space
Tight & Calcified Binding Sites
Hard turns in Lead Course

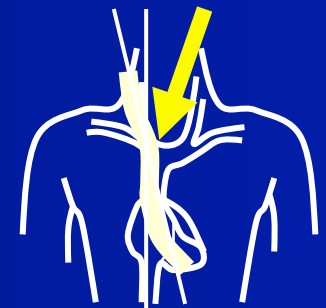
LIMITATION

Use of larger sheaths precluded
Difficult Dilatation, Power ineffective
No Rail Effect

SOLUTION

Internal TransJugular Approach

When dilatation was stopped at any binding site for 5 min,
or when dilatation was judged too risky,
the Internal Transjugular Approach was considered.



Lead Damage



PROBLEM	LIMITATION	SOLUTION
Damage or Loss of the Insulation	Obstacle to traction & dilatation, with further lead damage	Upsize the dilator, Gentle traction, Protect the coil,
Damage of the inner coil	Stylet stops early	Gentle traction
Damage of the ICD coil	Snowplowing effect	Upsize the dilator
Cables Externalization	Snowplowing effect	Upsize the dilator

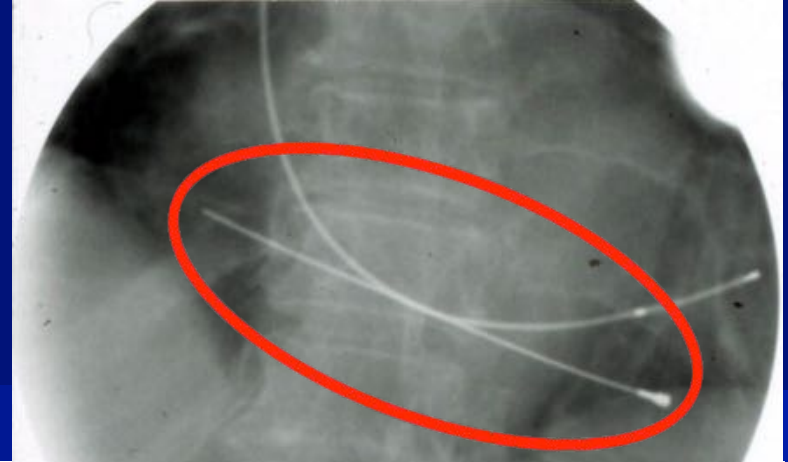
Lead Damage → Risk of Lead Fracture → Change Approach

SOLUTION

Internal TransJugular Approach



Free-Floating Leads



PROBLEM

Free-Floating Leads

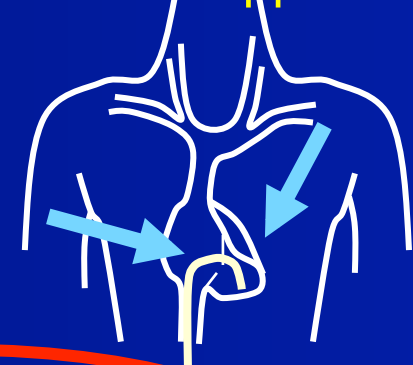
LIMITATION

Venous Entry Site Approach Impossible
Femoral Extraction Tecqniques may be Irreversible
Femoral Approach ineffective for dilatation

Femoral Extraction Techniques may be irreversible, making an open chest extraction necessary

Binding site dilatation with the transfemoral workstation is often ineffective at tricuspid valve and in the ventricle

Femoral Approach



SOLUTION

Internal TransJugular Approach



European perspective on lead extraction: Part II

Charles Kennergren, MD, PhD, FETCS

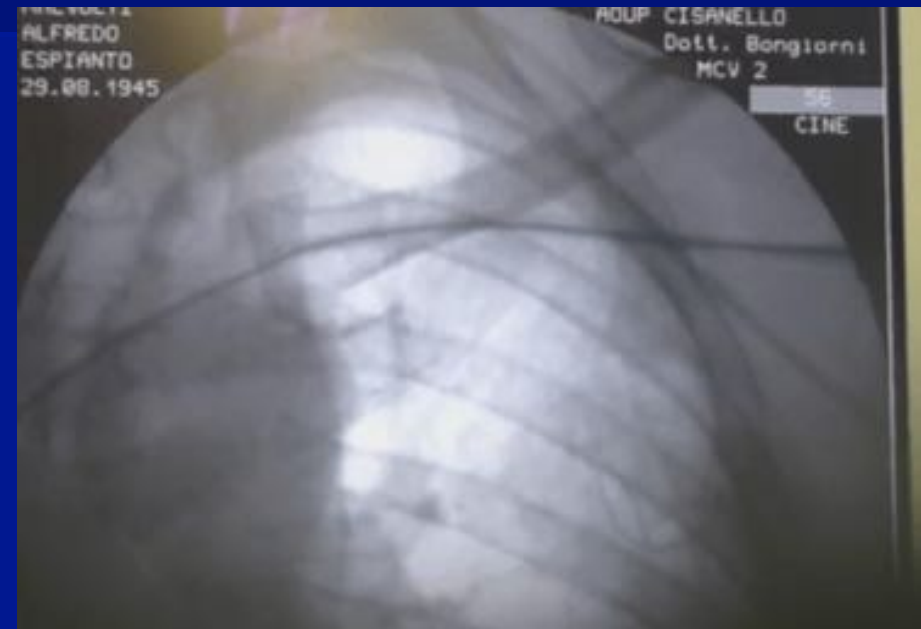
From the Department of Cardiothoracic Surgery, Sahlgrenska University Hospital, Gothenburg, Sweden.

The Pisa approach

Realizing that curved fibrotic leads are major obstacles, Bongiorno et al² devised techniques to avoid this problem. Left-sided leads are cut and dragged down into the inferior vena cava or lower by a femoral gooseneck snare catheter. The lead is grabbed again, but now from the right jugular vein, then pulled out and reinforced with a locking stylet. Finally, the lead is extracted using a mechanical sheath on a surprisingly straight line from the jugular vein to the atrium or ventricle. The straight line makes all the difference compared with the lead that originally followed the brachiocephalic curve. I have used the Bongiorno technique in combination with laser sheaths introduced through the right jugular vein and it has worked well on very fibrotic leads. This positive impression of the right jugular approach was reinforced when I extracted free-floating leads using special short Needle's Eye snares.



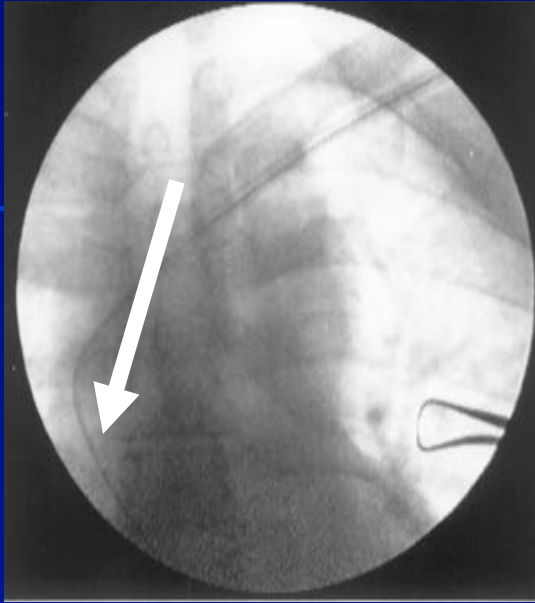
Importance of coaxial orientation of any sheath...



- to avoid vascular injury
- and increase success rate



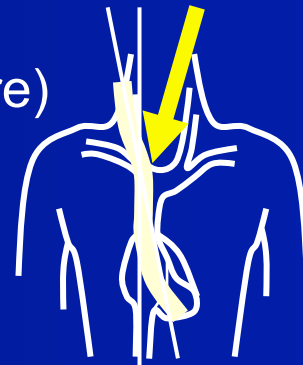
Importance of coaxial orientation of any sheath to avoid vascular injury



In case of **DIFFICULT LEADS** the ITA avoid:

- applying dilating force in the presence of significant turns in the course of the lead (→ SVC tear → complication)
- or excessive traction in the lead body (→ deterioration → failure)

Using the IJA the course of the lead is straight, all the way to its tip, and dilation energy can be applied exclusively to binding sites.



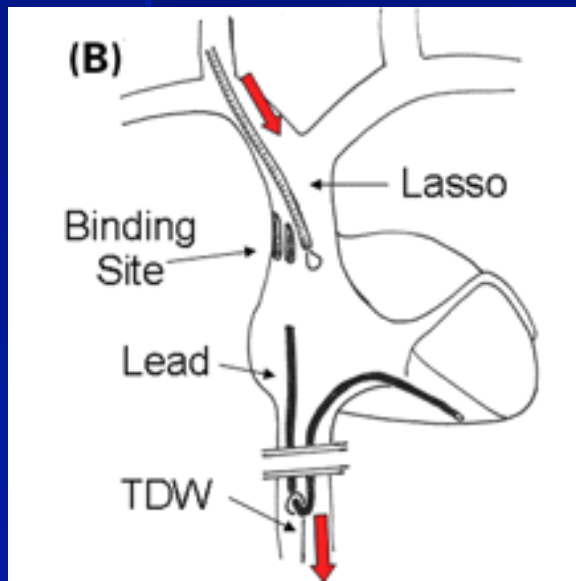
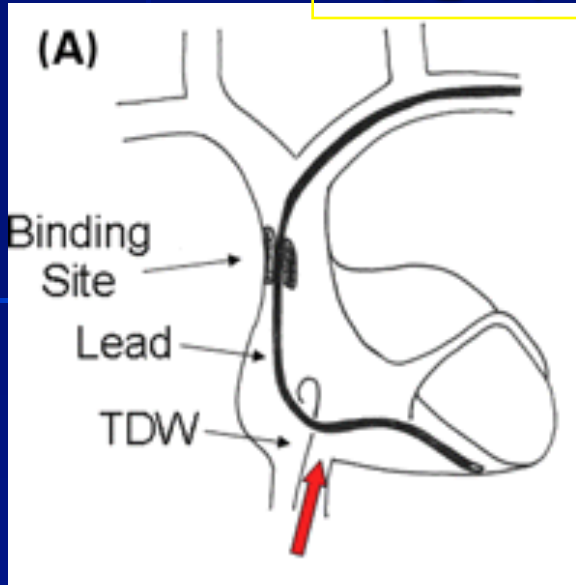
THE INTERNAL JUGULAR APPROACH



- METHODS:**◆ The lead is moved to run through the adherence
- ◆ Percutaneous puncture of the Right Internal Jugular vein is performed and an 11 Fr introducer is left in place



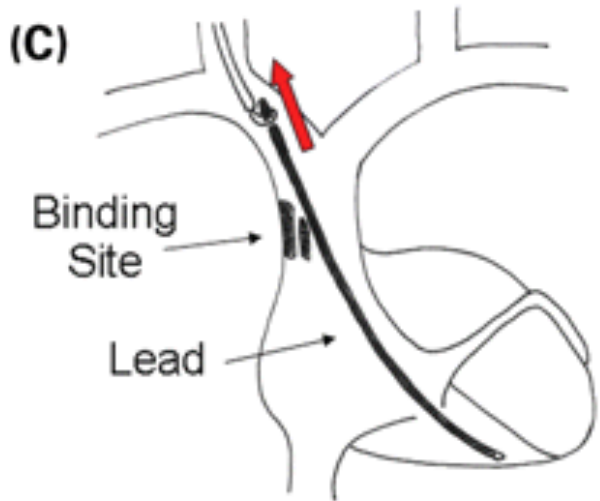
THE INTERNAL JUGULAR APPROACH



The proximal end of the lead is cutted;
A) The lead is caught by the tip deflecting wire introduced via the femoral vein;
B) The lead runs through the adherences and is made free-floating



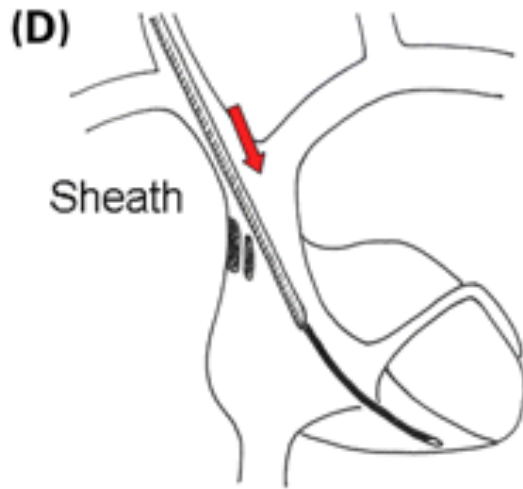
THE INTERNAL JUGULAR APPROACH



C) The proximal end of the lead is caught by the lassos and the lead is then exposed through the Internal Jugular vein



THE INTERNAL JUGULAR APPROACH



D) A standard procedure is performed by using mechanical sheaths

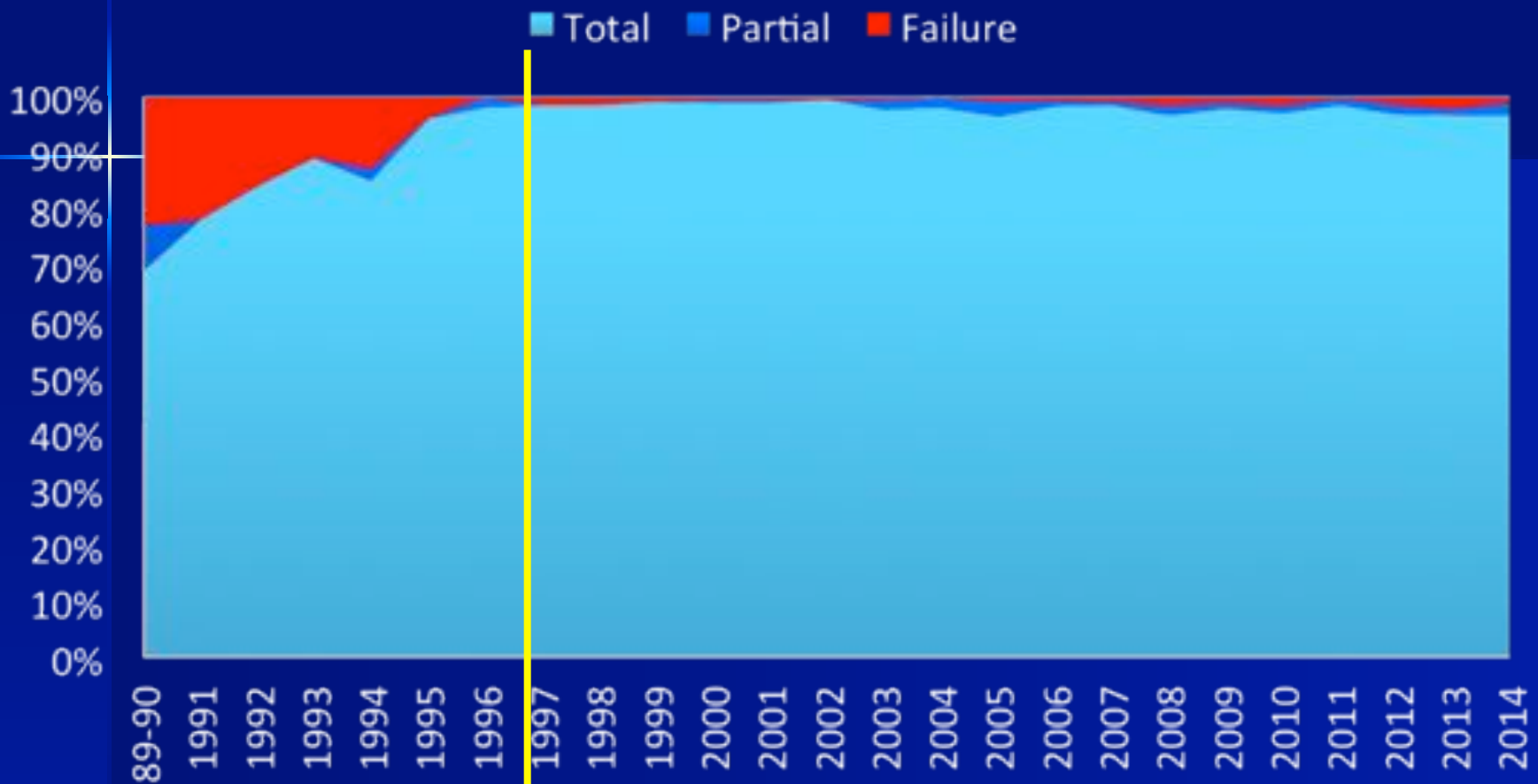


European
Heart Journal

Bongiorni, M. G. et al. Eur Heart J 2008 ; 29: 2886-93

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RESULTS / YEAR



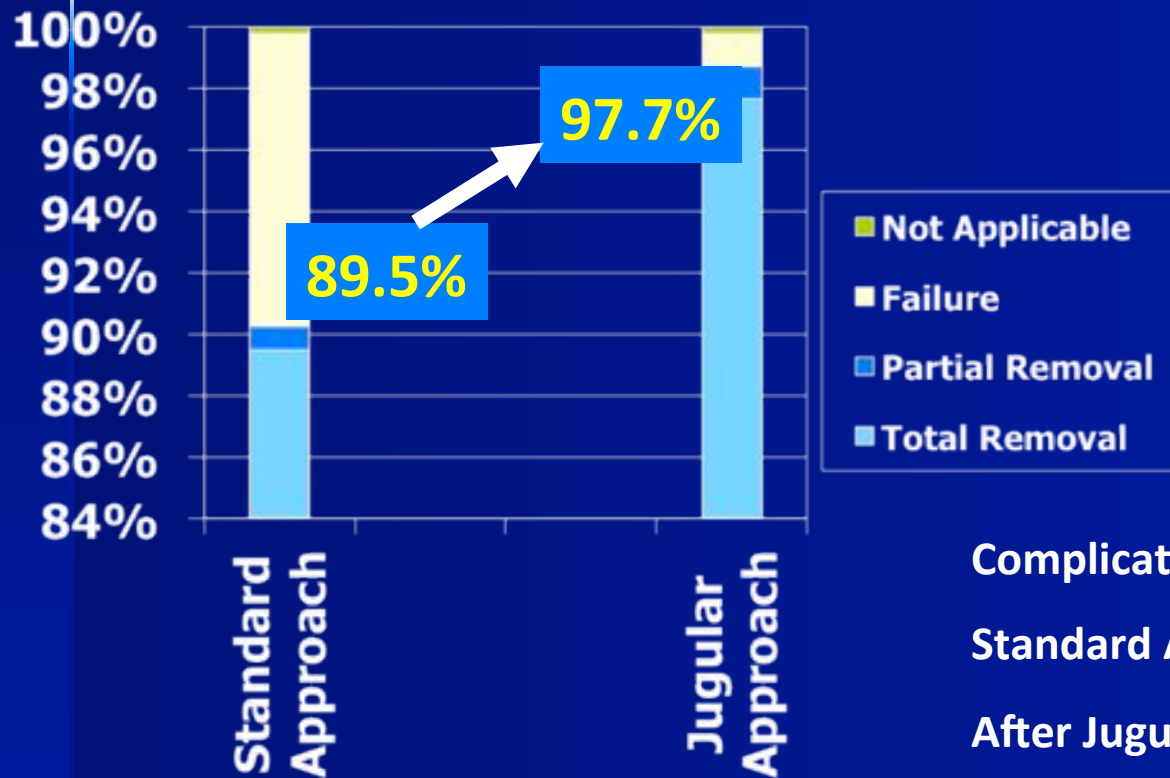
Jugular approach

(in case of failure of standard approach)



INTERNAL JUGULAR APPROACH

(January 1997 – July 2015)
2331 Patients - 4261 Leads



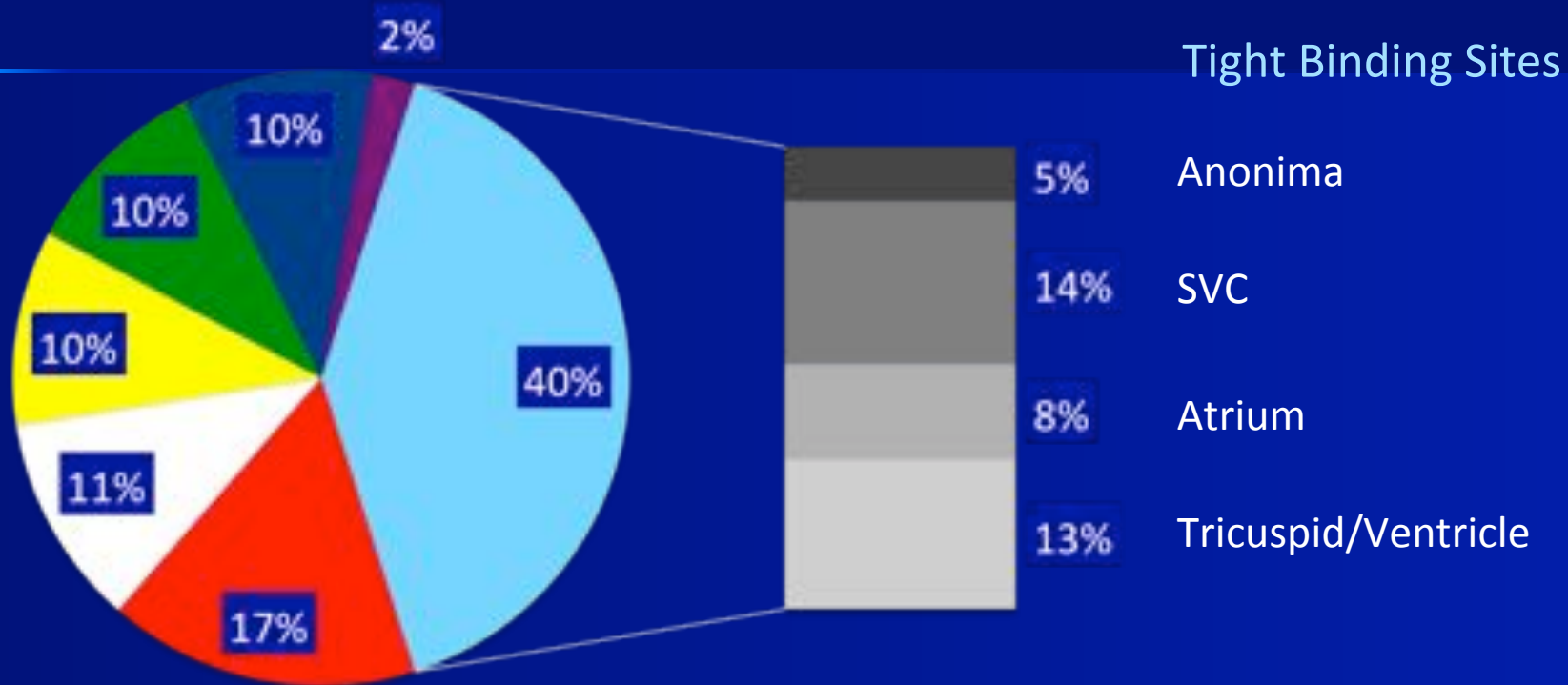
Complications:

Standard Approach: 0.4%

After Jugular Approach: 0.6%



Internal Transjugular Approach: Indications



- Intravascular Leads
- Lead Damaged during dilatation
- Incomplete Stylet Advancement
- Previous Unsuccessful Attempts
- Narrow Costo-Clavicular Space
- Other





Europace

doi:10.1093/europace/euu004

CLINICAL RESEARCH

Safety and efficacy of internal transjugular approach for transvenous extraction of implantable cardioverter defibrillator leads

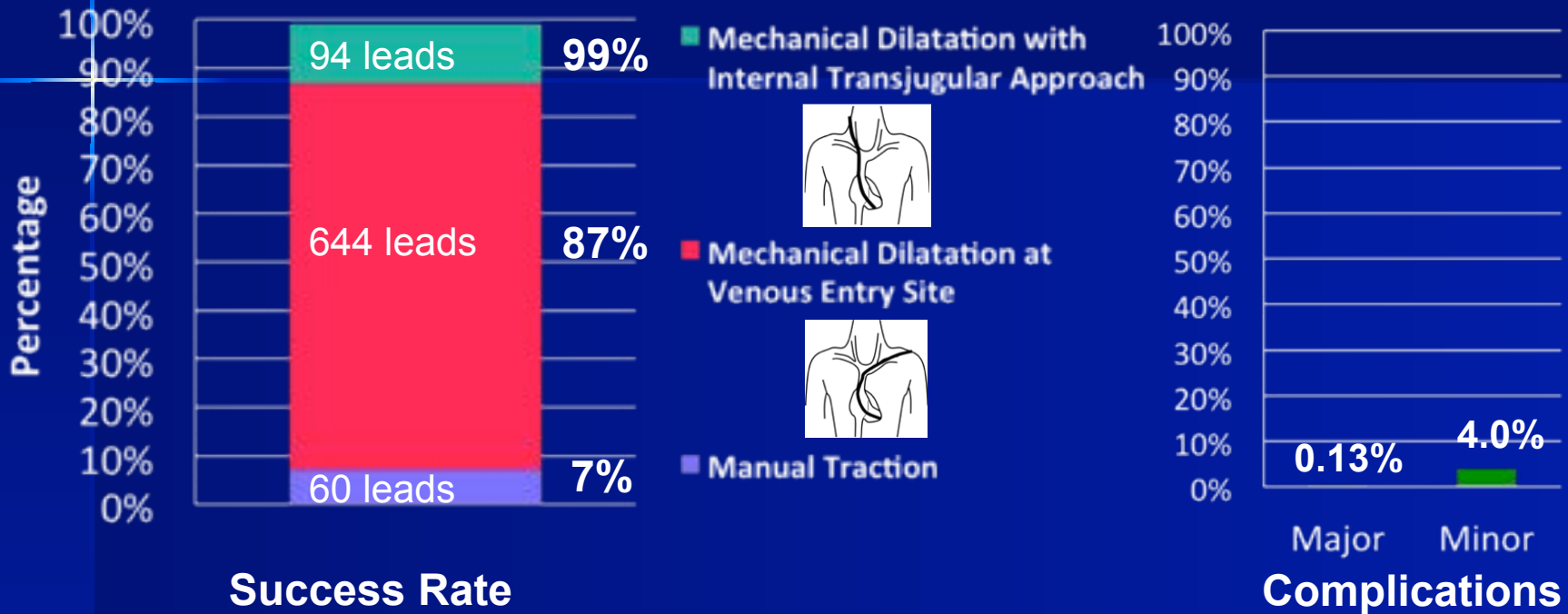
Maria Grazia Bongiorno*, Luca Segreti, Andrea Di Cori, Giulio Zucchelli, Stefano Viani, Luca Paperini, Raffaele De Lucia, Adriano Boem, Dianora Levorato, and Ezio Soldati

Europace 2014;16:1356-62.



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ICD Lead Extraction: Outcome and Approaches (807 leads - 754 patients)



ROC analysis recognized a **dwel-time of 20 months** as the cut-off that best predicted the need for **venous entry-site mechanical dilatation**, and **55 months** as that which predicted crossover to the **internal transjugular approach**.

At multivariate logistic regression analysis, **dwel time**, **passive fixation mechanism** and **dual coil lead design** were independent predictors of **fibrous adherence**.



modified from Bongiorno MG, Segreti L, Di Cori A, et al Europace 2014

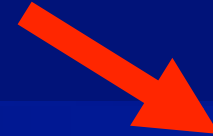
Riata leads Characteristics

- Fragility of insulation
- Damage of inner conductor
- Tissue ingrowth into the coils (1500)
- Conductors externalization



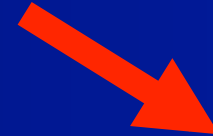
Riata leads Characteristics

- Damage of inner conductor



- Stylet stops early

- Tissue ingrow into the coils (1500)



- Need for dilatation

- Fragility of insulation



- Easy breakage

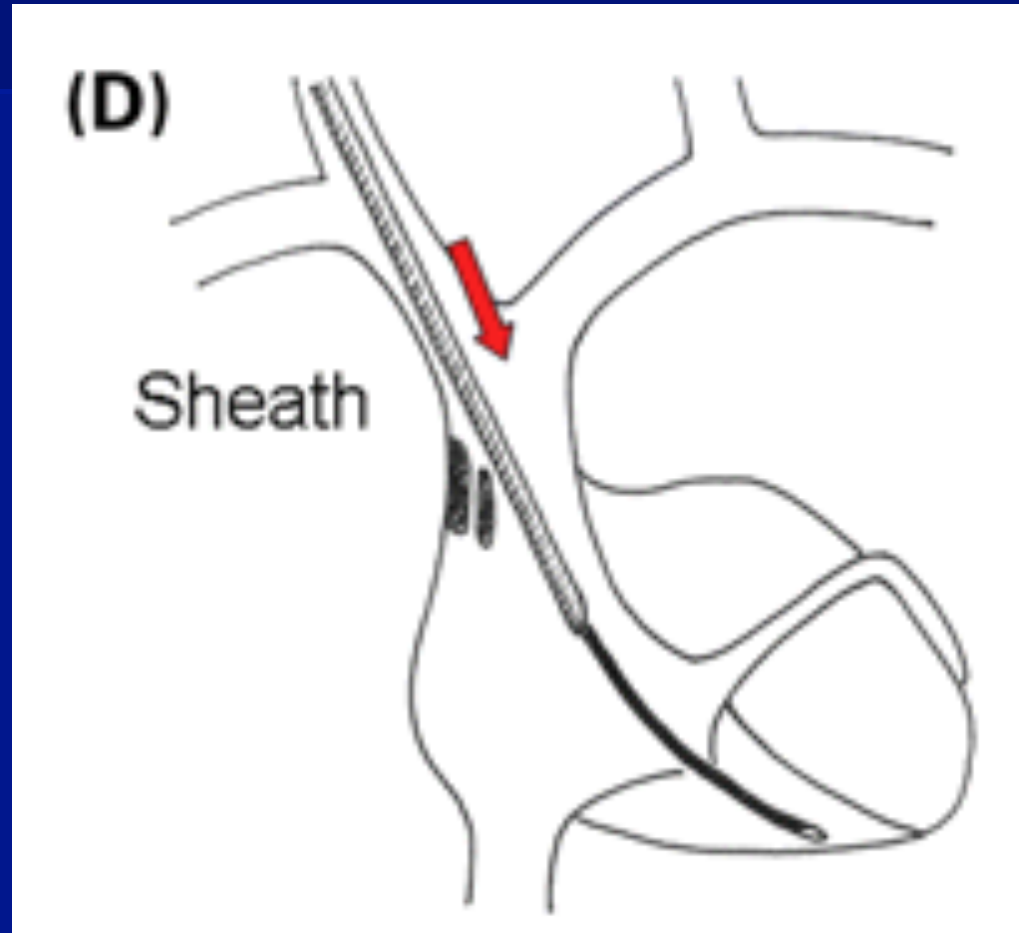
Difficult to use the rail effect



Riata leads Extraction

Internal Jugular Approach

- Straight course of the lead
- Free from binding sites
- Easier use of upsized dilators



CONCLUSION

- Transvenous lead extraction is today an effective and relatively safe procedure.
- The outcome is highly affected by the experience, techniques and materials.
- The Internal Jugular Approach enhances the effectiveness of the procedure while reducing the risk of complications.

