

GAVeCeLT 2017

X Congresso GAVeCeLT XI PICC Day



Firenze
4-5-6 dicembre 2017
Palazzo dei Congressi



Stato dell'arte degli accessi venosi:
tre quesiti attuali



Quale è la tecnica ideale per l'impianto dei PICC?

Antonio La Greca
Emergency and Trauma Surgery
"A. Gemelli" University Hospital - Rome

Gemelli

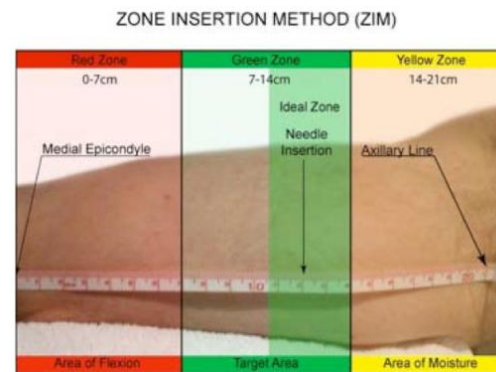
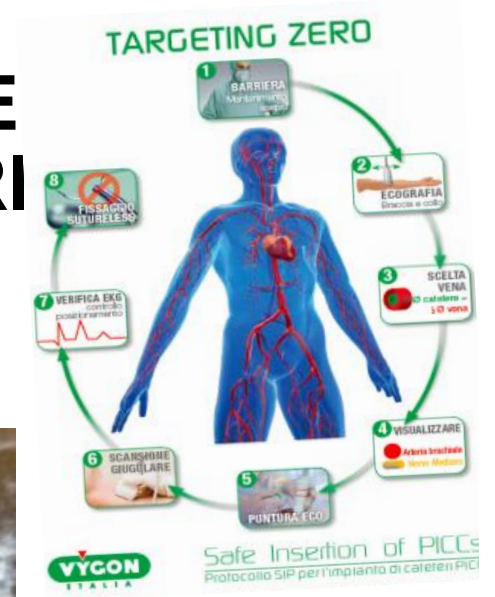


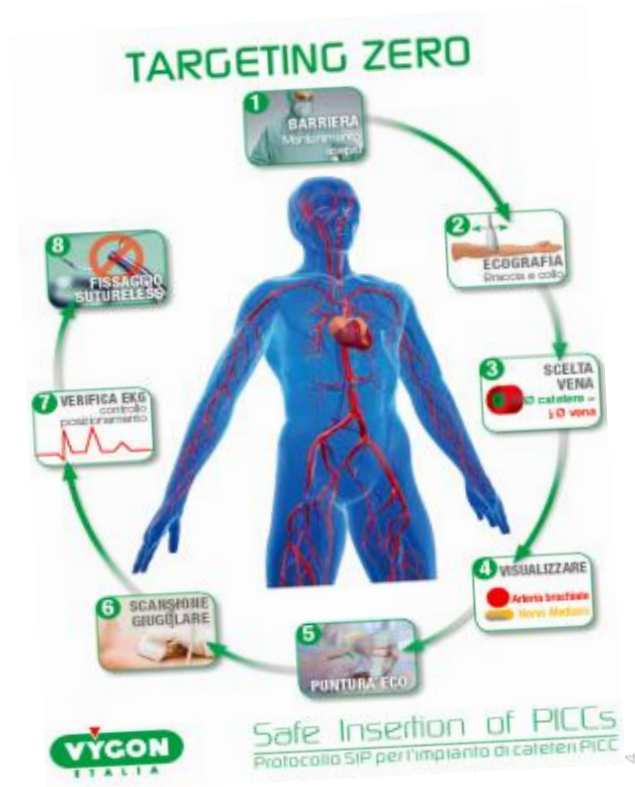
INSERTION: WELL DEFINED PROCEDURE ACCORDING TO THE FOLLOWING TRI

SIP Protocol (GAVeCeLT)

RaPeVa (GAVeCeLT)

ZIM (Dawson)





ASSIST INFERM RIC 2014; 33: 82-89

Alessandro Emoli,¹ Serena Cappuccio,¹ Bruno Marche,¹ Andrea Musarò,² Giancarlo Scoppettuolo,³ Mauro Pittiruti²

¹Day Hospital di Oncologia Medica

²Dipartimento Scienze Chirurgiche

³Istituto di Malattie Infettive

Policlinico Universitario A. Gemelli, Roma

Per corrispondenza: Serena Cappuccio, scappuccio@gmail.com

**Il protocollo 'ISP' (Inserzione Sicura dei PICC):
un "bundle" di otto raccomandazioni
per minimizzare le complicanze legate
all'impianto dei cateteri centrali
ad inserimento periferico (PICC)**

Protocollo ISP-2 (SIP-2)

- 1) Esplorazione ecografica sistematica di tutte le vene del braccio (dal gomito all'ascella) e delle vene maggiori della zona sottoclaveare e sopraclaveare, seguendo il protocollo RaPeVA (*Rapid Peripheral Vein Assessment*)
- 2) Igiene delle mani, disinfezione cutanea con clorexidina 2% in soluzione alcolica e utilizzo delle massime protezioni di barriera (mascherina e berretto non sterili, guanti sterili, camice sterile, ampio campo sterile sul paziente e coprisonda lungo per la sonda ecografica)
- 3) Scelta della vena più appropriata in termini di profondità e di calibro, a seconda del calibro del catetere pianificato (rapporto 1:3 tra diametro esterno del catetere e diametro interno della vena), utilizzando il sistema ZIM: se il sito di venipuntura ideale è situato nella zona gialla di Dawson, tunnellizzare il PICC in modo da ottenere il sito di emergenza nella zona verde
- 4) Chiara identificazione ecografica della arteria brachiale e del nervo mediano prima di procedere alla venipuntura (e quindi utilizzo quindi di ecografi che permettano la chiara identificazione del nervo)
- 5) Venipuntura ecoguidata *out-of-plane* in asse corto utilizzando appropriati kit di microintroduzione (ago 21G ecogenico, microguida in nitinol *soft straight tip*, microintroduttore-dilatatore di buona qualità)
- 6) Controllo e direzionamento del catetere (*tip navigation*) mediante ecografia della regione sopraclaveare (visualizzazione del catetere nella vena succlavia e nella vena anonima), particolarmente nei casi in cui vi siano ostacoli alla progressione o quando non si apprezzano modifiche dell'onda P all'ECG intracavitario
- 7) Controllo della posizione centrale della punta (*tip location*) mediante il metodo dell'ECG intracavitario, nella variante modificata per i pazienti in fibrillazione atriale, eventualmente corroborato dalla *tip location* mediante ecocardiografia transtoracica (CEUS: *contrast enhanced ultrasonography*)
- 8) Apposizione di colla in cianoacrilato al sito di emergenza + fissaggio con sistemi *sutureless* (preferendo i sistemi ad ancoraggio sottocutaneo nei pazienti ad alto rischio di dislocazione) + copertura con medicazione trasparente semipermeabile con buona traspirabilità (alto MVTR – *moisture vapor transfer rate*).

Novità

- Colla in cianoacrilato
- **Tunnellizzazione**
- Sistemi ancoraggio sottocutaneo
- **ECG modificato**



Nuova prospettive per i PICC:

TUNNELIZZAZIONE

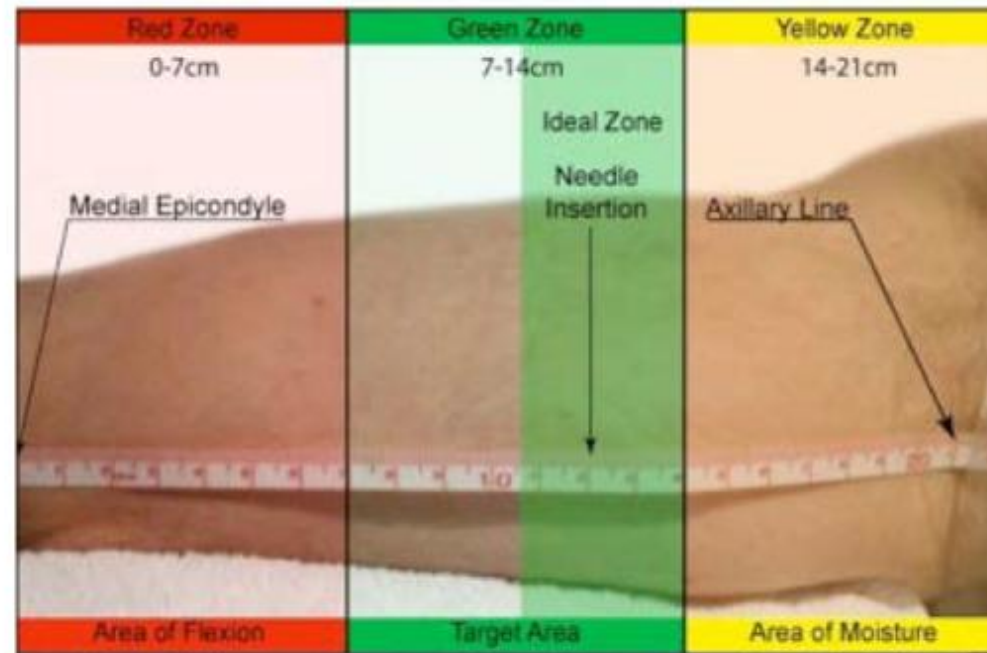
Espansione delle indicazioni

Posizionamento in vene
adeguate anche se molto
prossimali

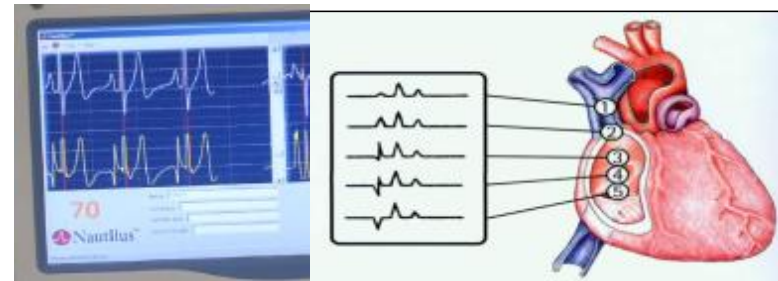


Zone di Dawson

ZONE INSERTION METHOD (ZIM)







- E. Use methods for identifying CVAD tip location during the insertion procedure (ie, “real time”) due to greater accuracy, more rapid initiation of infusion therapy, and reduced costs.
1. Use electrocardiogram (ECG) methods with either a metal guidewire or a column of normal saline inside the catheter lumen and observe the ECG tracing to place the CVAD tip at the CAJ. Follow manufacturers’ directions for use with other ECG-based technology using a changing light pattern to detect tip location.

Ultrasound scan of deep veins of the arm

Ultrasound guided venipuncture

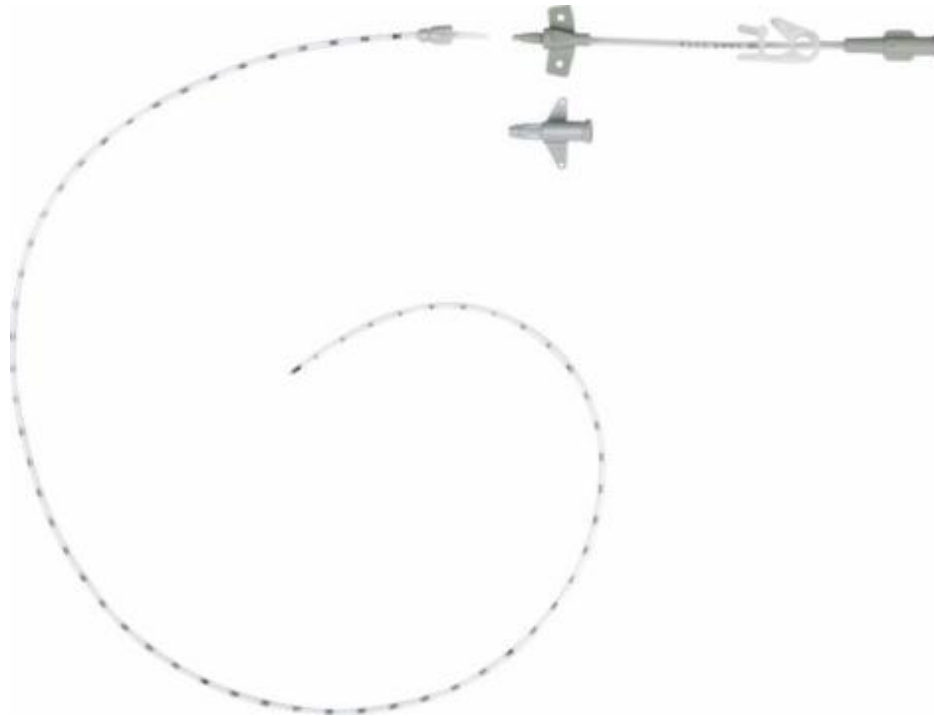
Tip location by IC-EKG

Tunneling (when needed)

Securement

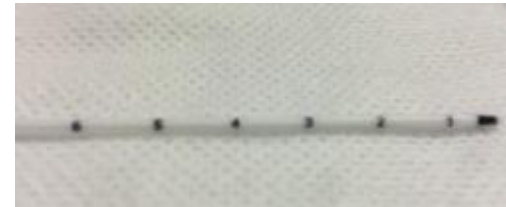
PICC Easy

Key feature: proximal trimming



PICC Easy

Key feature: proximal trimming



Proximal trimming?

- It is not just a curiosity, but a feature which makes PICC insertion simpler and more effective
 - management of the catheter is easier and faster
 - tip location is easier and more precise
 - tunneling (if needed) becomes easier
 - The extracutaneous length of the catheter can be precisely programmed

PICC Easy insertion (no tunnel)



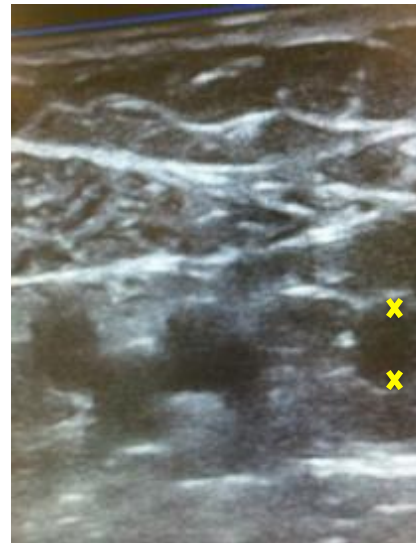
Ultrasound scan



RaPeVA: Rapid Peripheral Vein Assessment
To be completed with a scan of infra/supraclavicular veins



Ultrasound scan



Vein diameter should be measured without tourniquet
Ratio between vein vs. catheter diameter should be 3:1 or more



Ultrasound scan



If the chosen puncture site is in the yellow zone, tunnel is needed (so to get the exit site in the green zone)

Ultrasound guided venipuncture

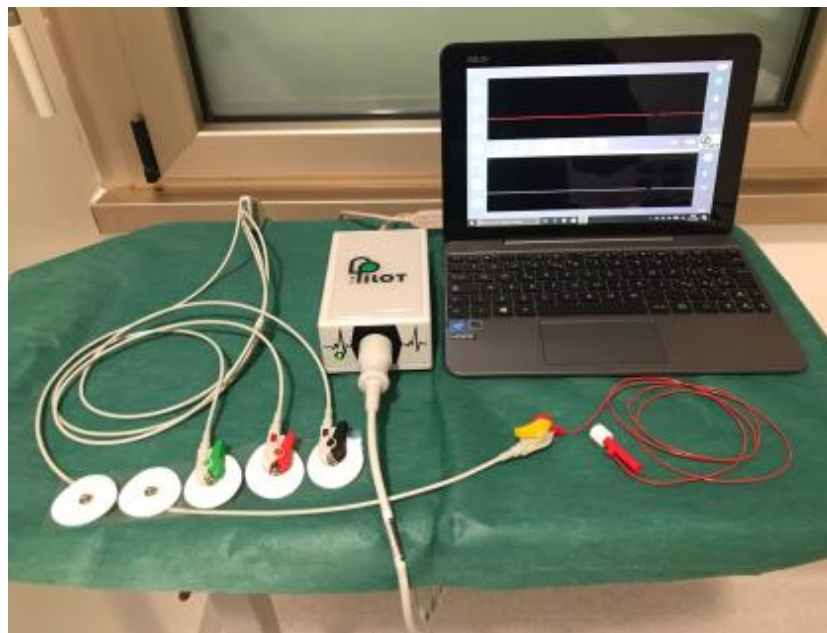
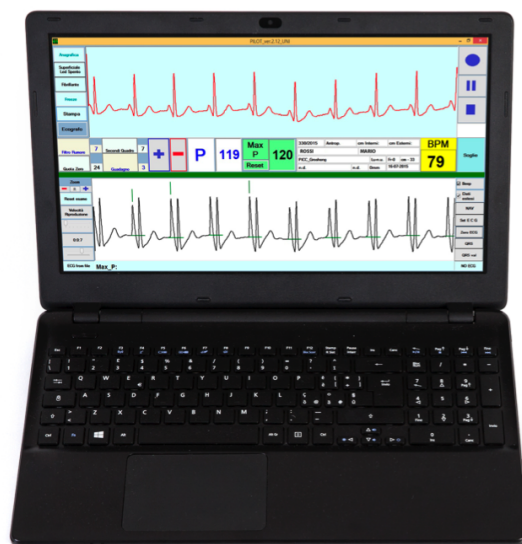


EKG is set (Pilot; three electrodes)

Preparation of the material (best choice: to use an 'insertion pack')

Insertion pack

- Highly convenient
 - Reduces the overall costs
 - Reduces the risk of errors
 - Simplifies the procedure
 - It is recommended by guidelines (SHEA 2014) as a measure for preventing infection



Ultrasound guided venipuncture





Modified (indirect) Seldinger technique







nlamnete

PICC tagliabile prossimalmente

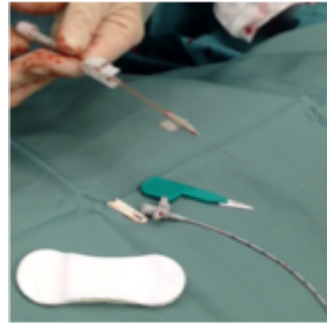


Precisione metodo ECG
Eventuale tunnel sia retrogrado che anterogrado
Non necessaria misurazione preventiva del tunnel
Spazio per biopatch "a misura"



Trimming and connection

Proximal trimming



Connection



PICC Easy

- Proximal trimming:
 - It is simple and easy
 - It keeps the tip integer
 - Inappropriate trimming may yield tips potentially more traumatic to the endothelium
 - Allows to decide exactly how much of the catheter length should be left outside of the skin
 - Do you need 1-2 cm for biopatch ?
 - Do you need 3 cm for securacath ?
 - Etc.

PICC Easy

- It is also ideal when tunneling is needed

When is tunneling needed?

- When the ideal puncture site is NOT the ideal exit site
 - See Dawson's ZIM

PICC Easy insertion (short tunnel)

Dawson's Zone Insertion Method



ZIM

- Best option for puncture: in the yellow zone
 - Large, easy vein
 - Still, too proximal as an exit site

Tunneling brings the exit site more distally, to the green zone

Tunneling



- Ultrasound guided local anesthesia



Tunneling



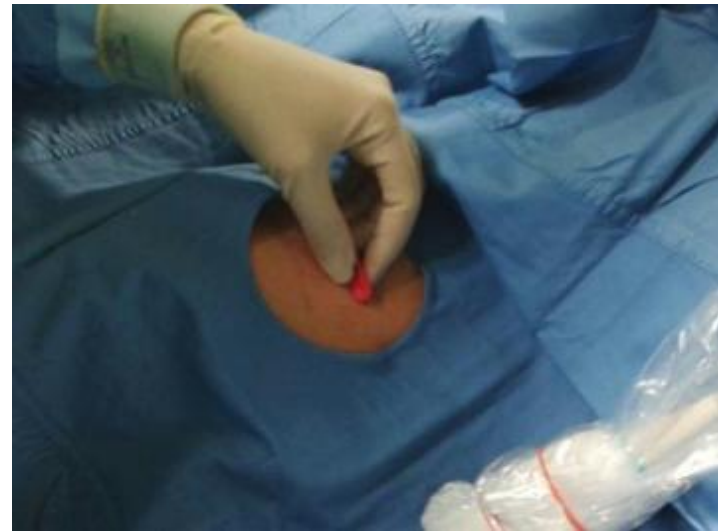
- Venipuncture without tourniquet (vein too close to the axilla)

Tunneling



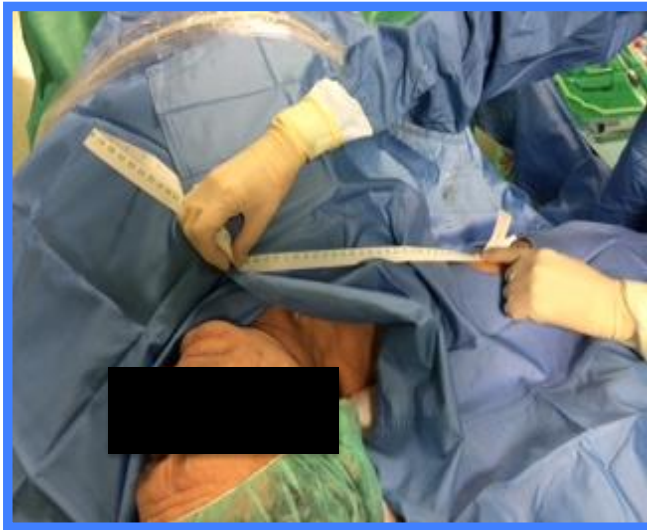
- Puncture site is slightly enlarged by a small incision

Tunneling



- Microintroducer

Tunneling



- Measures are taken and the PICC is inserted untrimmed

PICC Easy

- Reduced importance of the accuracy of the landmark measurements
- Though, landmark measurement is recommended: it gives you a rough idea of how deep the catheter is expected to be threaded

PICC easy

It is ideal for tip location with intracavitary EKG: the untrimmed catheter is pushed forward, until the proper central location is reached (maximal P wave = cavo-atrial junction)

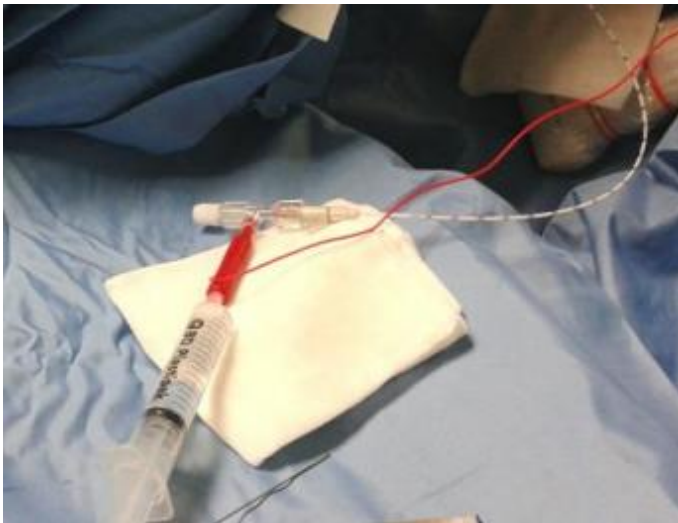
- no risk of trimming the catheter too short

(tip in suboptimal position – failure to see the peak of the P wave)

- no risk of trimming the catheter too long

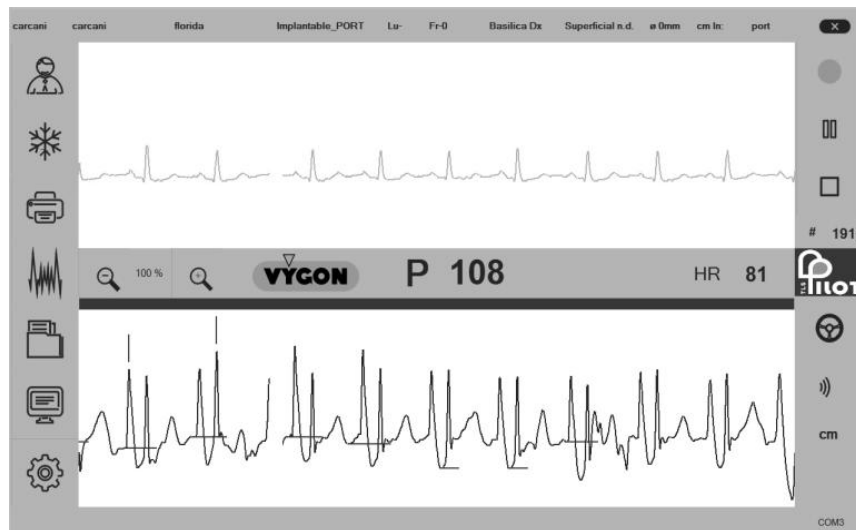
(extracutaneous length of the PICC embarrassing long)

Tunneling



- Tip navigation (to rule out wrong direction of the catheter)

Tunneling



- Tip location (tip verified to be at the cavo-atrial junction)
- Local anesthesia (ideally: 0.75% ropivacaine) to prepare the tunnel

Tunneling



- Tunneling is performed using a 14G needle cannula
- A 14G cannula is large enough to allow the passage of a 4Fr or 5Fr catheter

Tunneling



- A 4-5 cm tunnel is appropriate in most cases

Tunneling



- The incision on the puncture site is closed with cyanoacrylate glue

Tunneling



- Trimming and connection

Tunneling



- Flush and lock with saline
- Dressing

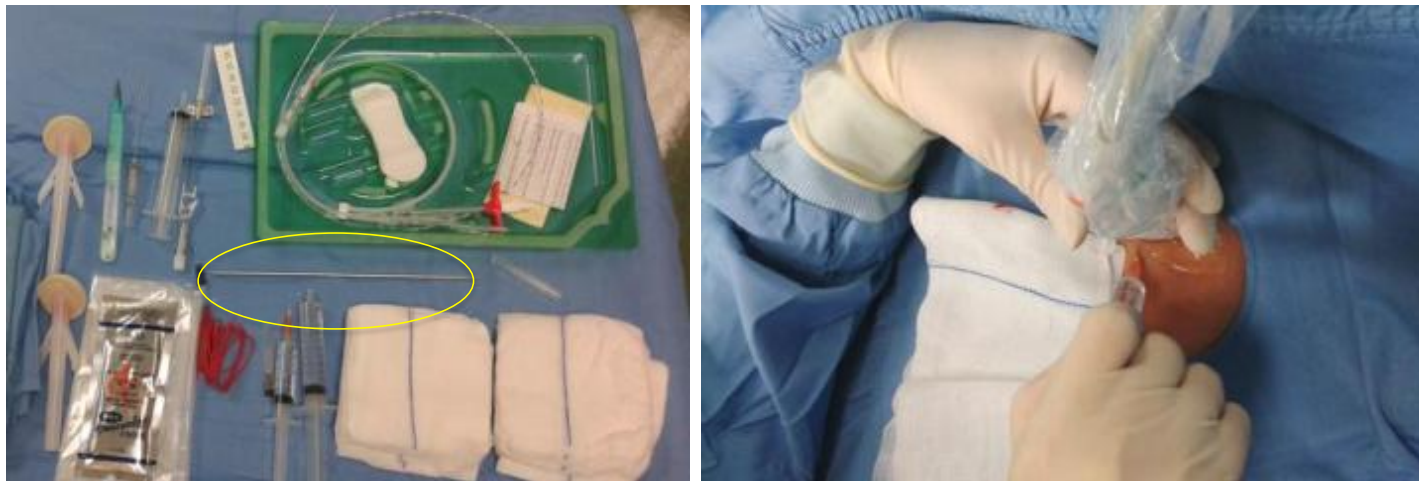
PICC Easy insertion (long tunnel)



Tunneling - 2



Tunneling - 2



- Preparation of the material (including a metallic tunneler)
- Ultrasound guided local anesthesia

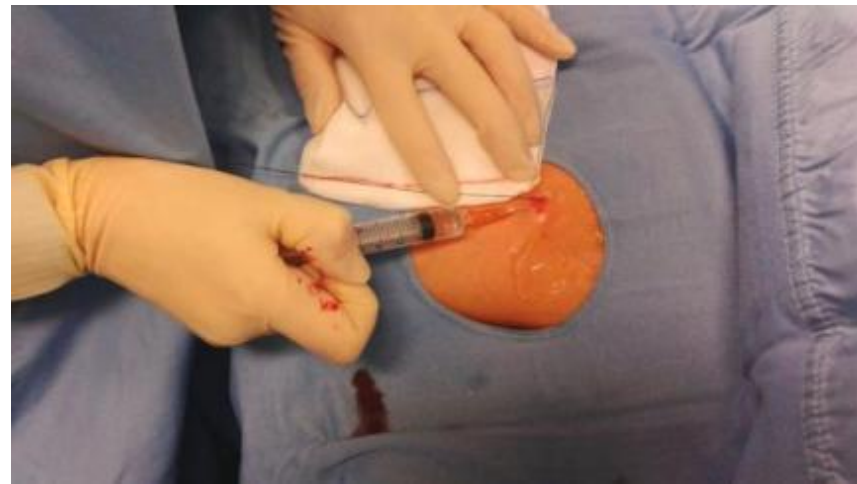
Tunneling - 2



- Ultrasound guided venipuncture



Tunneling - 2



- The nitinol .018" guidewire is inserted
- More local anesthesia on the puncture site

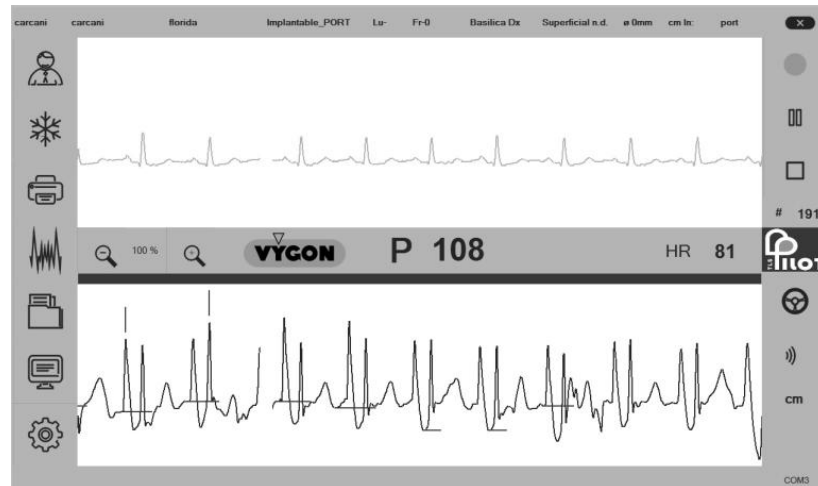


Tunneling - 2



- The puncture site is enlarged with a small incision
- The microintroducer is threaded over the guidewire

Tunneling - 2



- The untrimmed catheter is inserted into the microintroducer
- Tip navigation and tip location

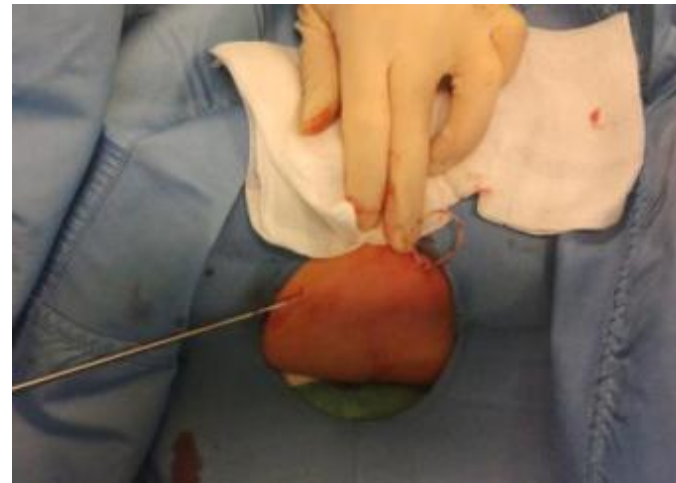
Tunneling - 2



- Microintroducer is removed by peeling it away
- The tunnel is prepared by infiltration of local anesthesia



Tunneling - 2



- The tunneling maneuver is now performed with a metallic tunneler (Tunnelers are preferred when a long tunnel is needed)

Tunneling - 2



- The catheter is attached to the tunneler and threaded through the tunnel
- Trimming and connection

PICC easy & tunneling

Both anterograde and retrograde tunneling is possible

ANTEROGRADE TUNNELING

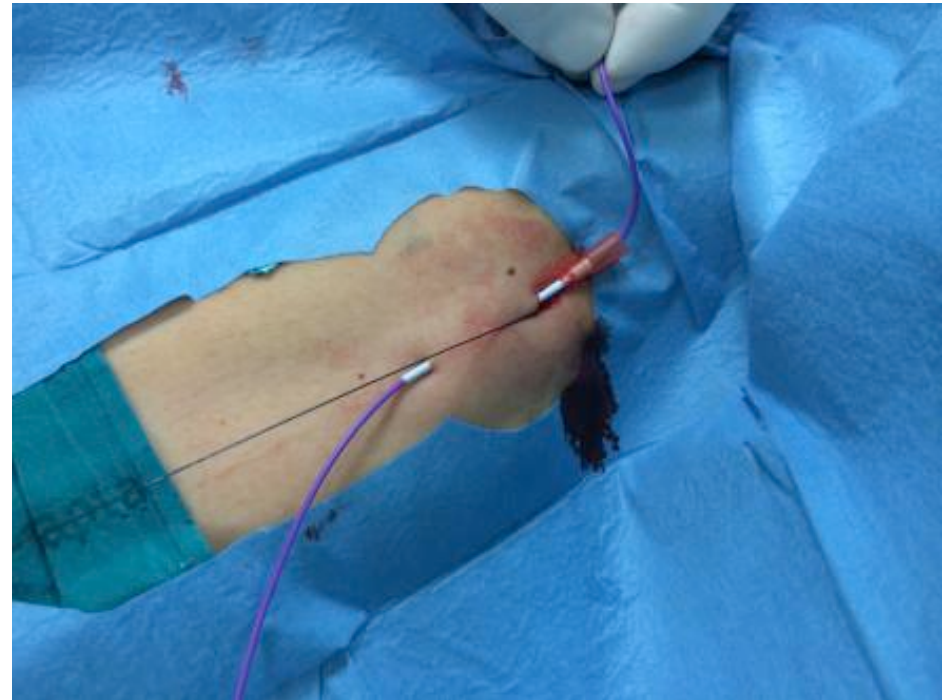
1. The distal end of the catheter is passed under the skin
2. The catheter is inserted in the microintroducer
3. The tip location is performed by IC-ECG

RETROGRADE TUNNELING (easier!)

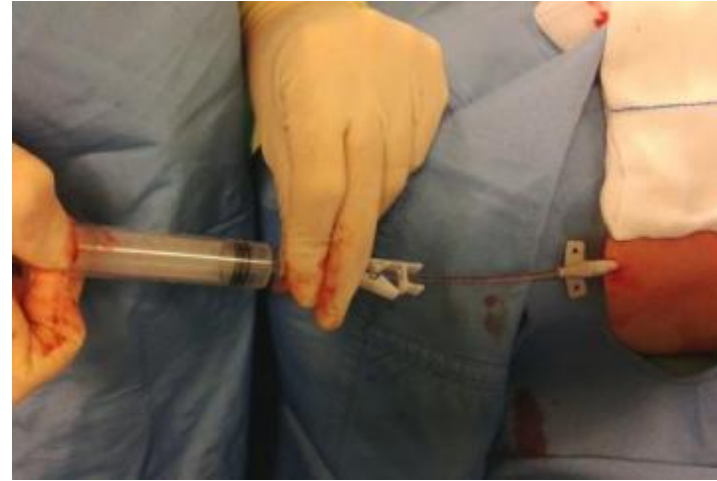
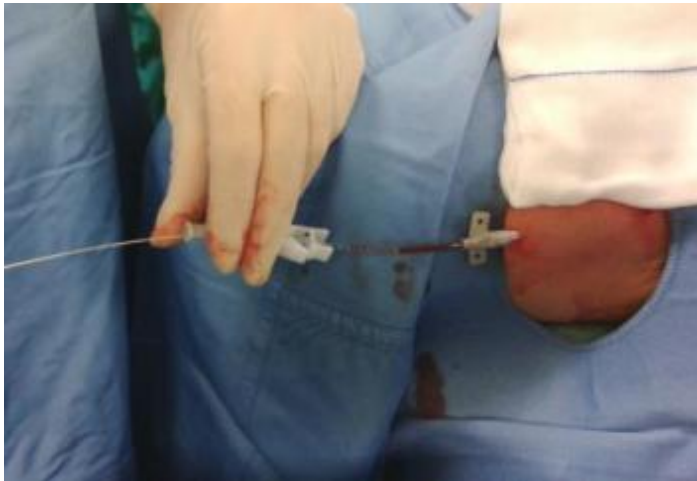
1. The catheter is inserted into the microintroducer
2. The tip location is performed by IC-ECG
3. The proximal end of the catheter is passed under the skin

PICC easy & tunneling

Both a tunneler or a cannula may be used



Tunneling - 2



- After the connection, removal of the stylet
- Flush and lock with saline

Tunneling - 2



- A 2cm length of the catheter is left outside the skin
- The catheter is secured by a subcutaneous anchored device (Securacath)

Tunneling - 2



Subcutaneous anchored securement

- One of the most interesting and promising novelties of the last two years
- The best securement strategy: reliable, safe, long lasting, cost effective
- Ideal with PICC Easy (extracutaneous length can be planned so to accept the Securacath with great precision)

Subcutaneous anchored securement

- Securacath and glue go together well !
- Securacath and tunneling go together well !!
- Securacath and PICC easy go together well !!!

Conclusions

Advantages of proximal trimming

1. The whole maneuver becomes simpler
2. The tip of the catheter stays integer (less risk of inappropriate trimming)
3. Tip location by intracavitary EKG becomes easier
4. Tunneling becomes easier (both antegrade and retrograde tunneling are possible)
5. The length of extracutaneous catheter can be programmed precisely (short or long, depending on the clinical indication)

PICC Easy

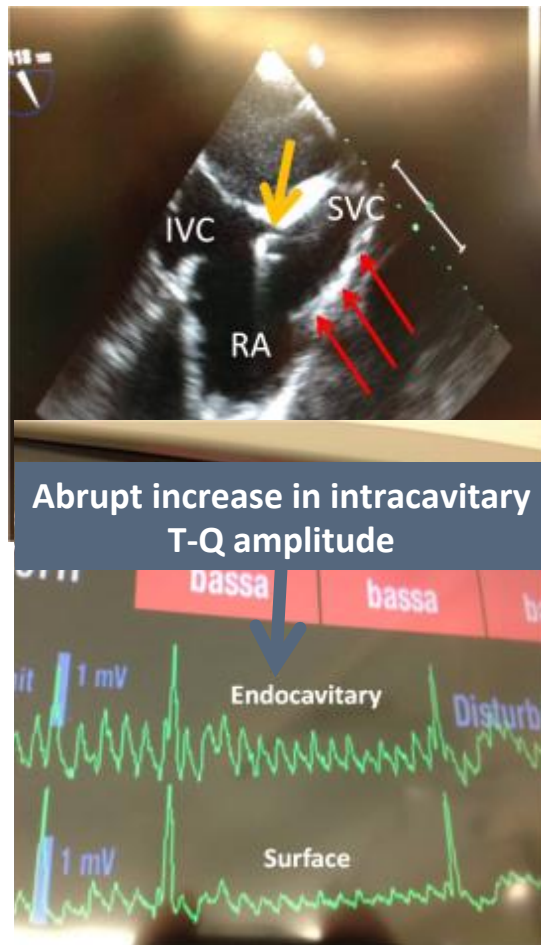
- User friendly
- Ideal with the **old-fashioned technique** of insertion
- Ideal with all the **new techniques** of PICC insertion
 - Tip navigation and tip location by IC-EKG
 - Tunneling
 - Glue
 - Subcutaneously anchored securement
 -

PICC Easy

Super-precision in PICC insertion

IL FUTURO

- Monitor ECG 'standard' VS monitor ECG 'dedicati' ???
- Quale sistema di tip navigation ?
- Strategia di tip location nei pazienti con FA ??



- Under TEE, an abrupt increase in the mean intracavitary amplitude of the asynchronous atrial electrical activity (i.e. the T-Q segment on the ECG trace) as compared to the surface trace is recorded with the J-tip placed at the crista terminalis.
- A clear reduction in amplitude is evident in the two alternative positions (SVC and deep RA) in all patients.



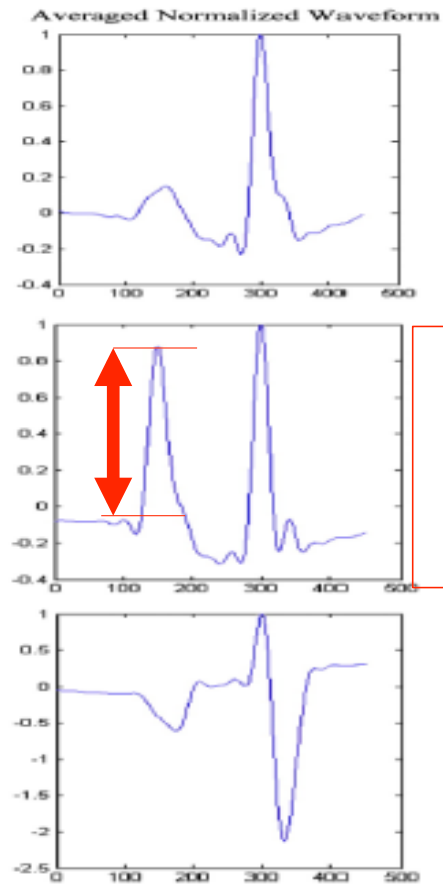
UNIVERSITÀ
CATTOLICA
del Sacro Cuore



- While patients are being enrolled, further IC-ECG traces analysis is ongoing to define quantitative parameters allowing a more refined correlation between IC-ECG and tip position in FA patients (i.e.: energy et al.)

Improving applicability – FA

Which quantitative parameter ?



mm
or
mV

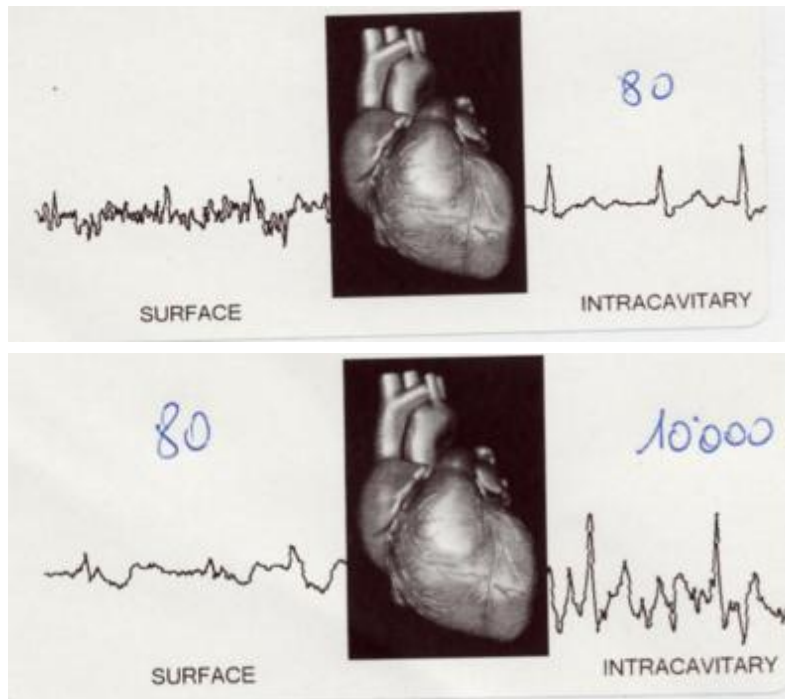


???

Improving applicability of IC-ECG (atrial fibrillation)

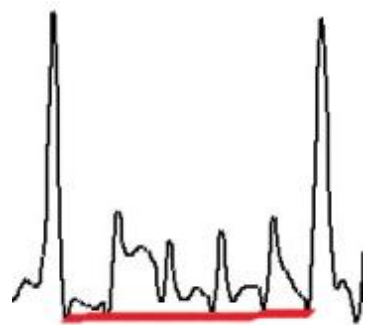
Using specialized “digital” ECG monitors

The area under the T-Q segment = atrial energy

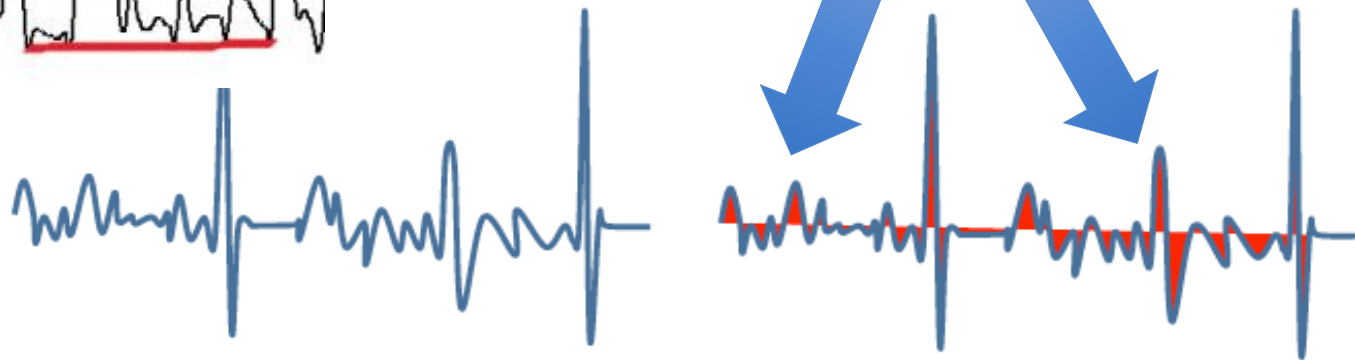


Improving applicability of IC-ECG (atrial fibrillation)

The area under the T-Q segment (atrial “energy”) might be related to the cavo-atrial junction tip location



But it is different during examination in the same tip position !!! (different duration of the T-Q segment)



Improving applicability FA – Study 3

The mean peak-to-peak maximal voltage might be related to the cavo-atrial junction tip location (more constant in different measurements at the same tip position)



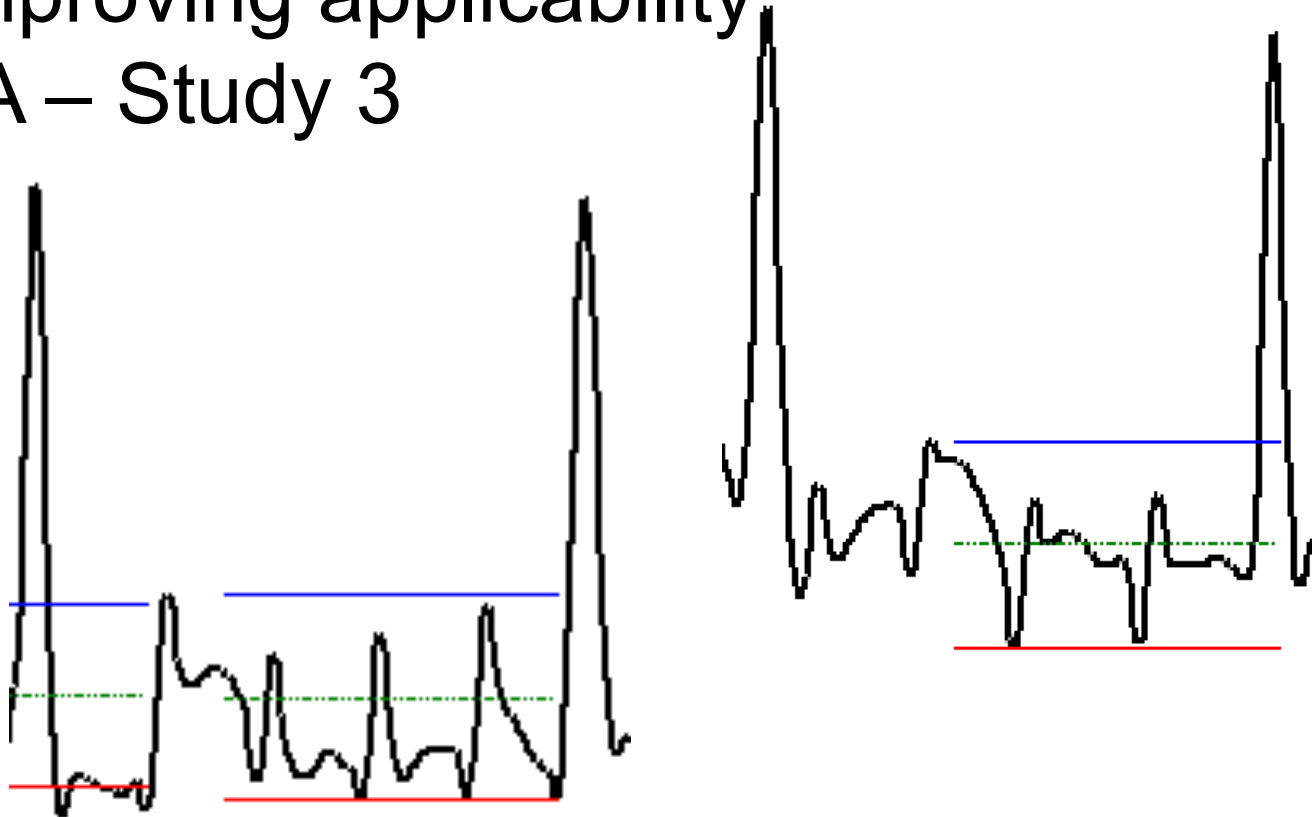
Improving applicability

FA – Study 3

- Same principles as study 2
 - IC-ECG + TEE during cardiac surgery
 - 3 tip positions under TEE (CAJ, CAJ + 2 cm, CAJ – 2 cm)
 - IC-ECG at the 3 positions
- Parameter:
 - mean value of the maximal F wave recorded in each T-Q segment during 5 cardiac cycles (***post-recording HUMAN READING***)

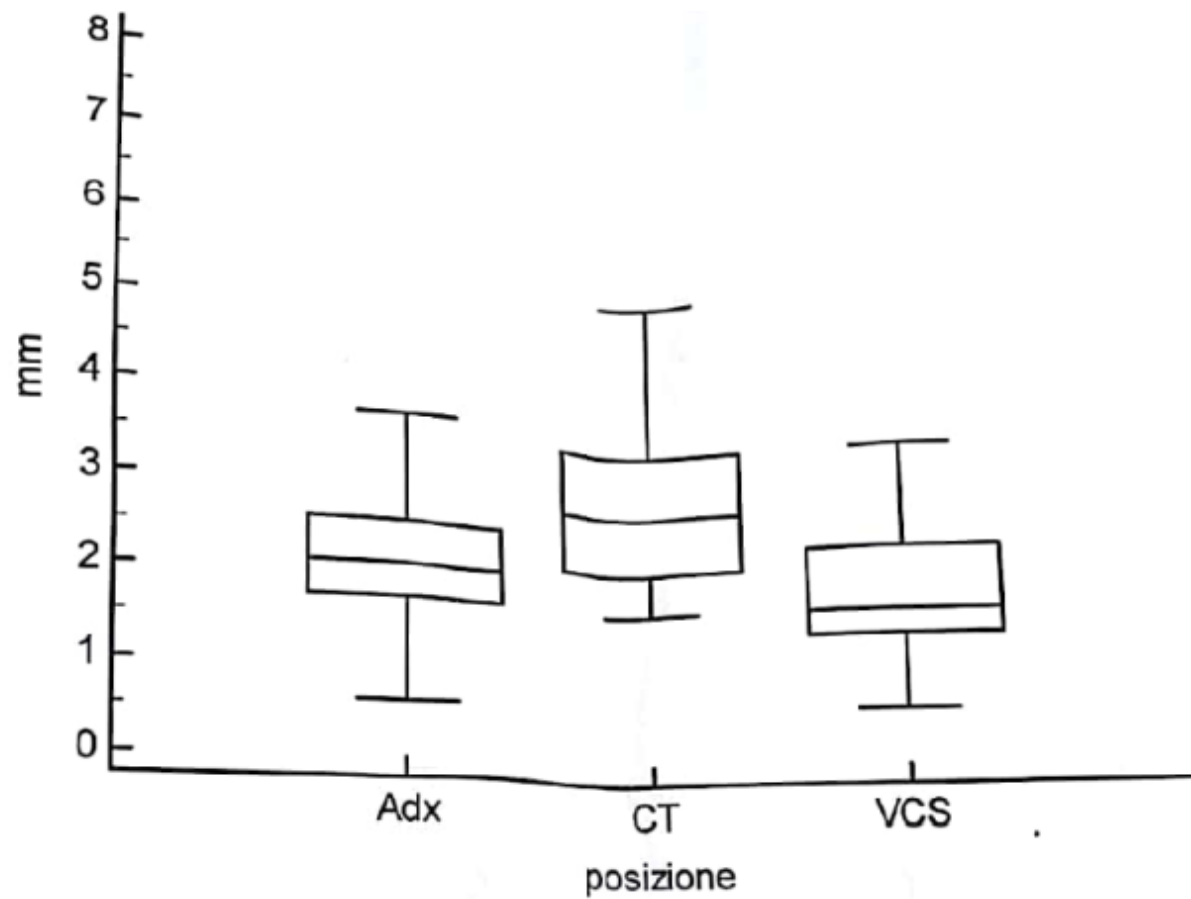
Improving applicability

FA – Study 3



- 20 patients enrolled, data analysis completed (submitted for publication)

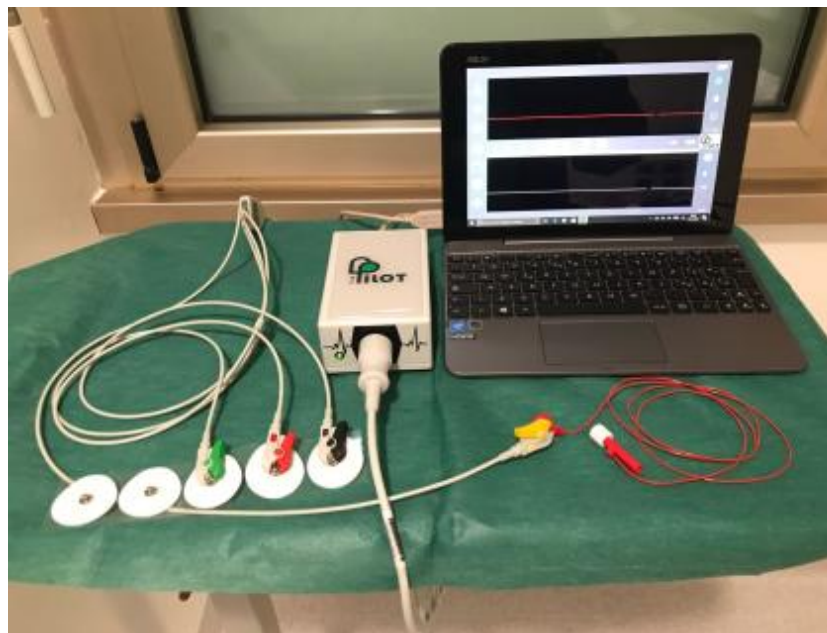
Improving applicability FA – Study 3



Improving applicability FA – Study 4

The mean peack-to-peack maximal voltage might be related to the cavo-atrial junction tip location (more costant in different measurements at the same tip position)

Using specialized “digital” ECG monitors
to calculate this mean value ***DURING THE PROCEDURE***
and on 20 cycles instead of 5

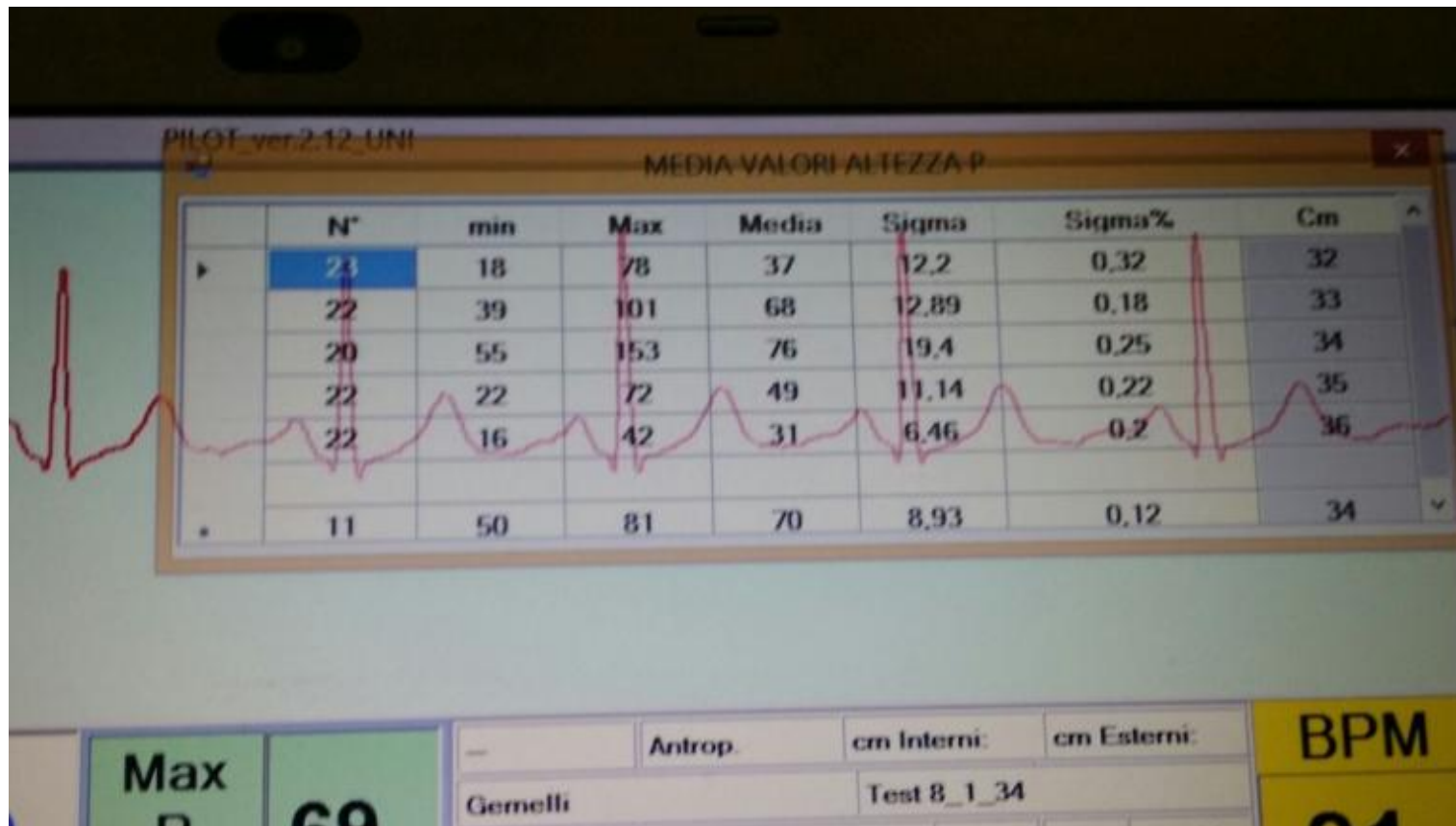


Improving applicability FA – Study 4

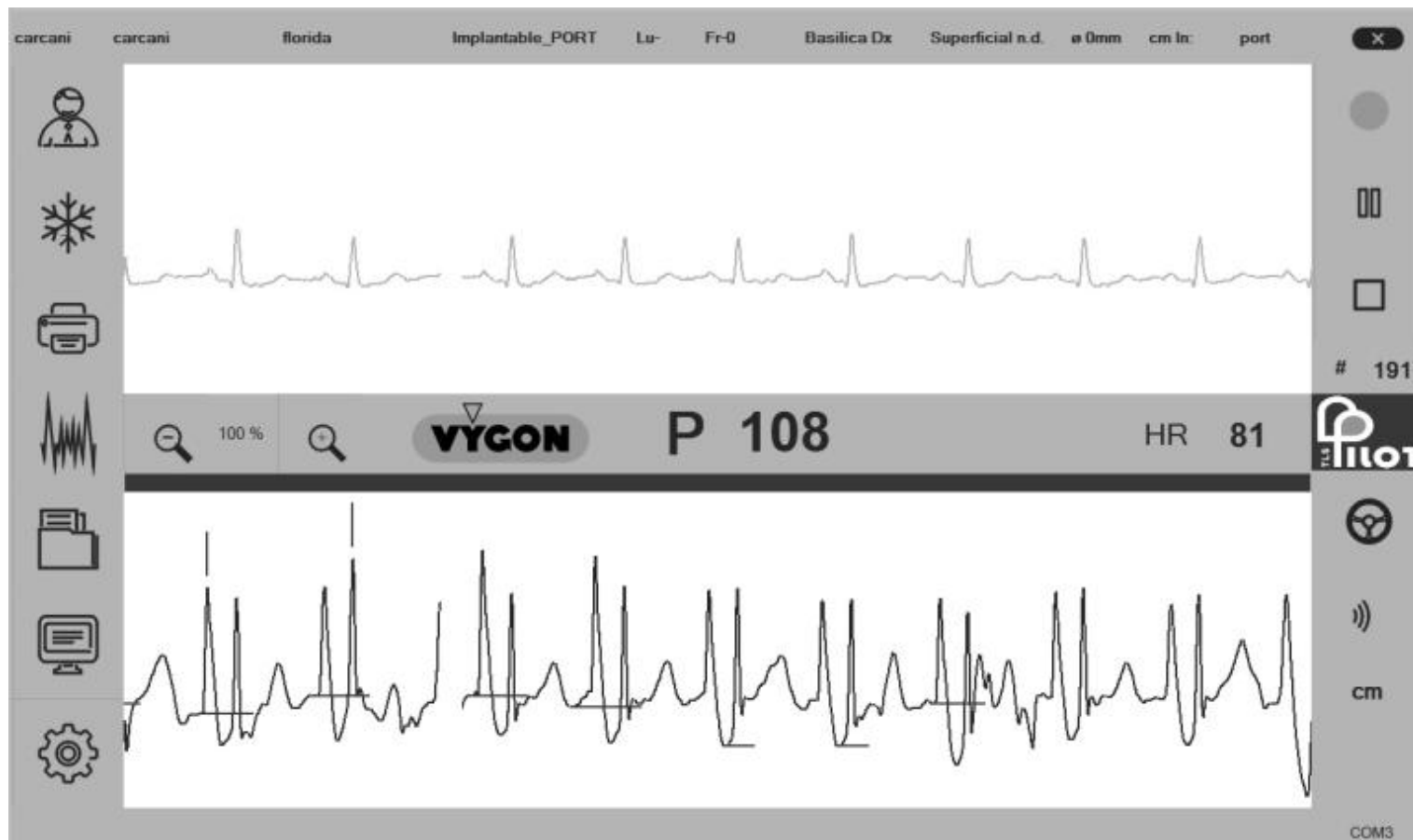


Improving applicability

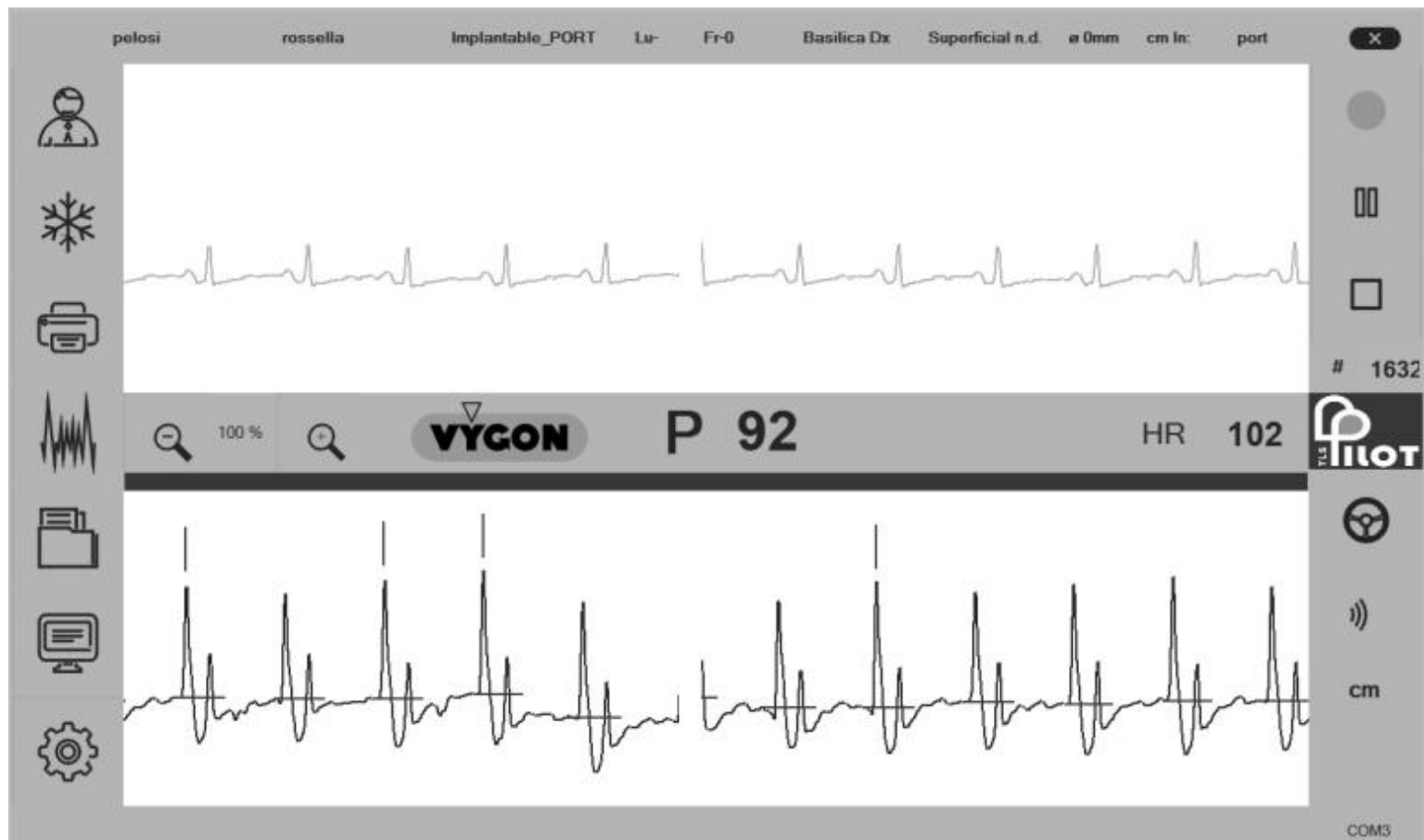
FA – Study 4



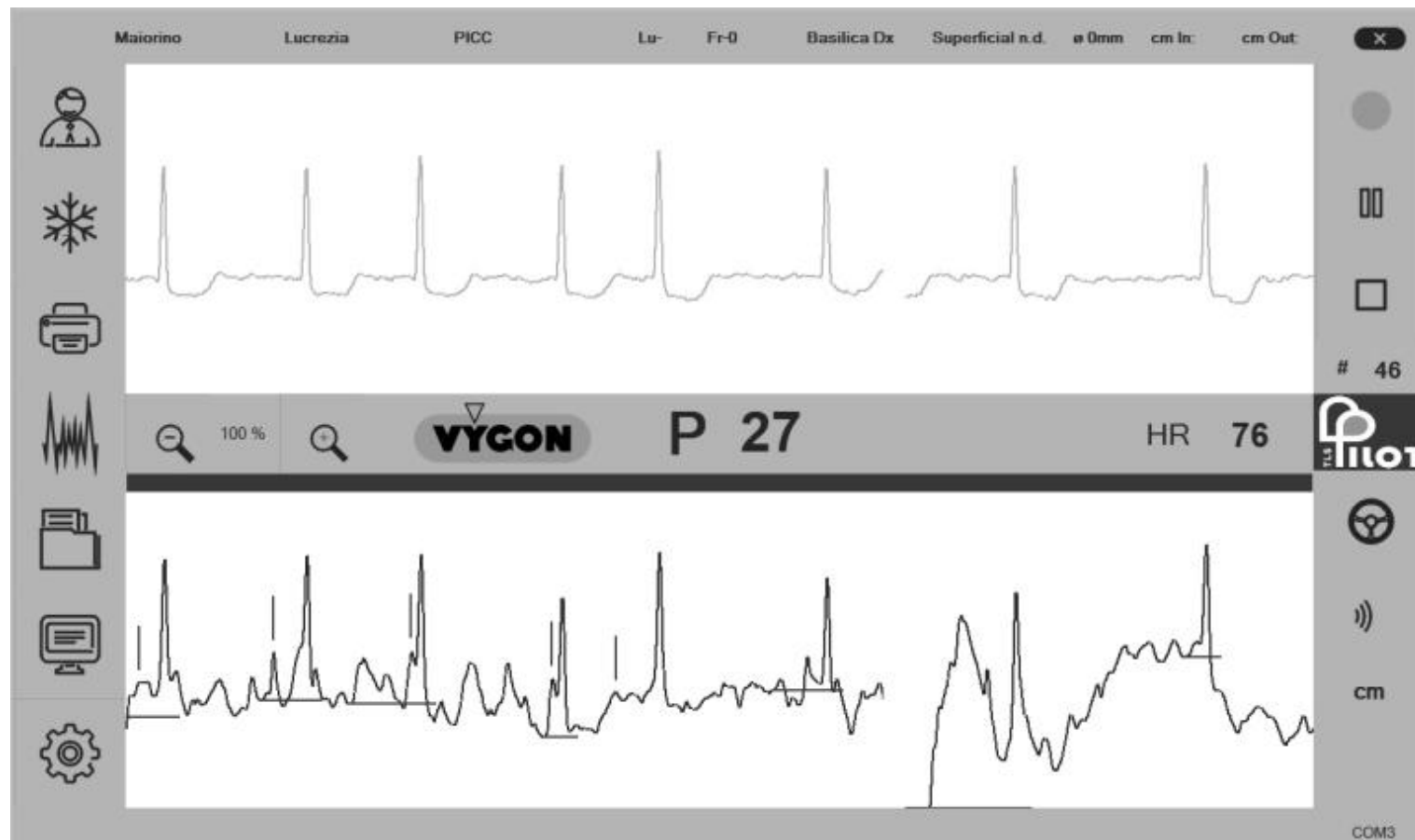
Improving applicability FA – Study 4



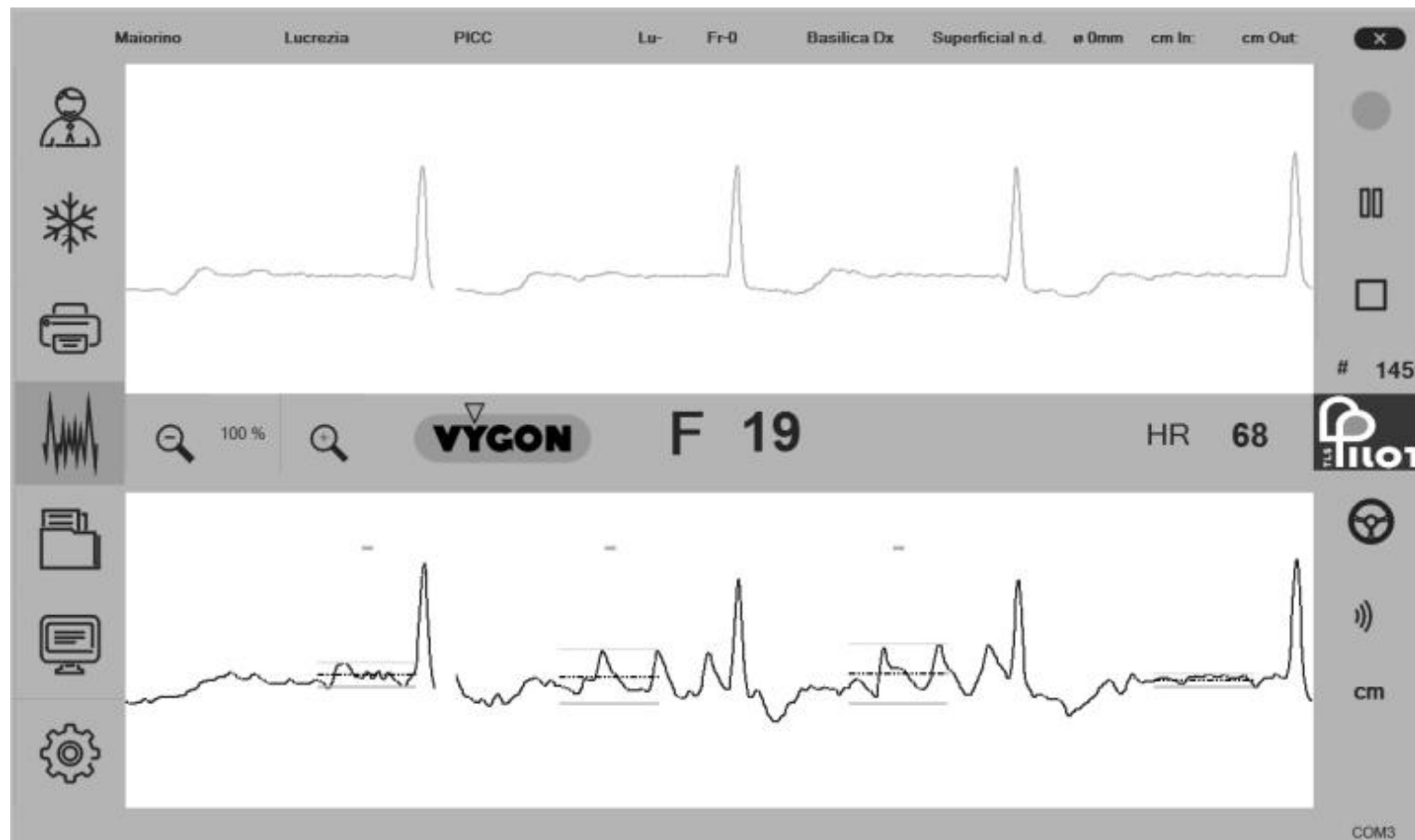
Improving applicability FA – Study 4



Improving applicability FA – Study 4



Improving applicability FA – Study 4

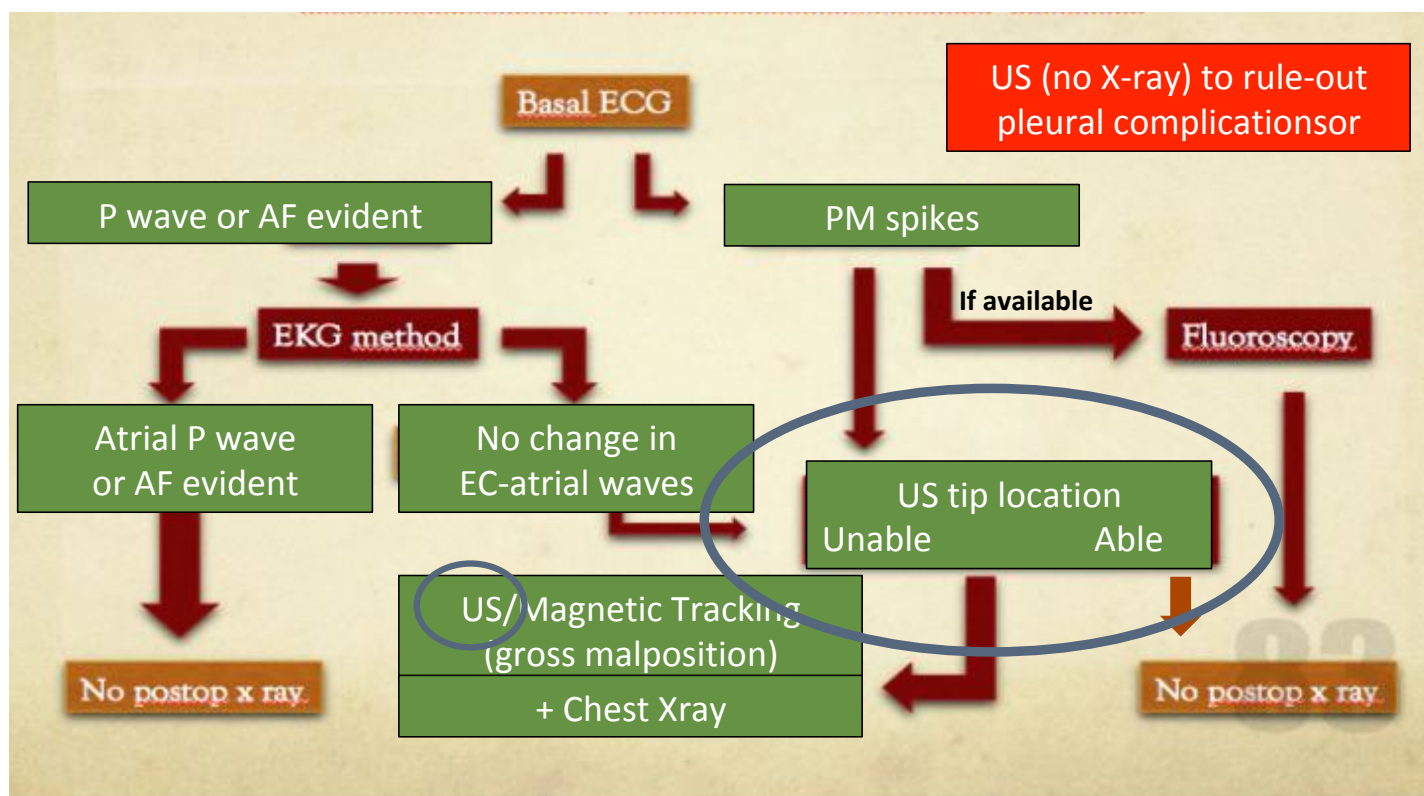


Improving IC-ECG results



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Our proposal of an “advanced” algorithm





GRAZIE !!!

Gemelli



GAVeCeLT 2017

