

FEEDBACK TO THE FIELD (FT2F) #9:

*Placement of Humeral Intraosseous Intravenous (IO-IV) Devices**

AFMES: COL (Ret) H.T. Harcke, MC, USA**

Lt Col E. L. Mazuchowski, USAF, MC

DHA MED LOG: CDR T. Brunstetter, MSC, USN

* RE-ISSUE: Original Released AFIP/OAFME June 2011

** American Registry of Pathology in support of AFMES

DISCLAIMER

The opinions or assertions presented hereafter are the private views of the authors and should not be construed as official or as reflecting the views of the Department of Defense, its branches, the Armed Forces Medical Examiner System or the DHA Medical Logistics Division.

Original Issue

FEEDBACK TO THE FIELD (FT2F): Placement of Humeral Intraosseous Intravenous (IO-IV) Devices (Part 1/2)

AFMES: H T Harcke, COL, MC, USA

G Crawley, Lt Col, USAF, MC

E Mazuchowski, Lt Col , USAF, MC

DMMPO: B Ritter, Maj, USAF, BSC, PA-C

C Shull, COL, DC, USA

OVERVIEW:

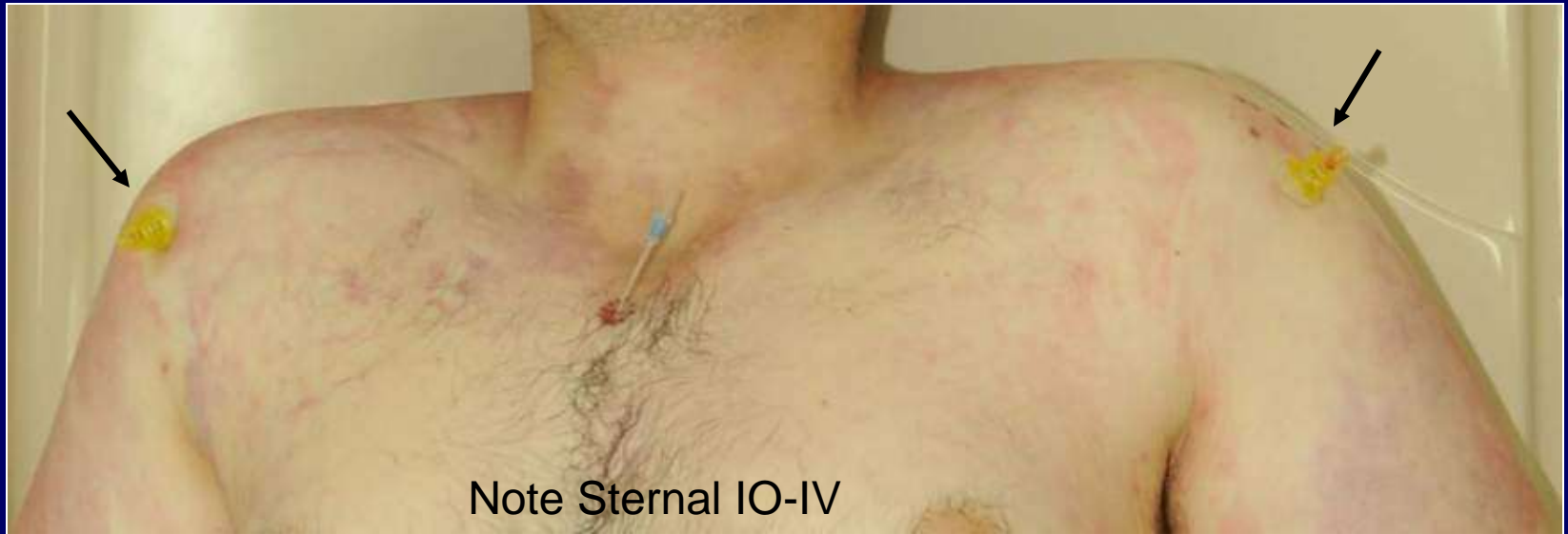
- Intraosseous Intravenous (IO-IV) Devices are being used for emergency treatment in the Combat Zone
- Preferred sites are the sternum and proximal tibia with the proximal humerus as an alternative site.
- We report an assessment of humeral IO-IV placement based upon the Computed Tomographic (CT) Imaging that precedes each autopsy at the Dover AFB Mortuary.

BACKGROUND

- Humeral IO-IV's are present less frequently than sternal and tibial IO-IV's. [Sternum 52, Tibia 34, Humerus 19]*.
- Either a 25 mm or 45 mm EZ-IO[®] (Vidacare, Shavano Park, Texas) needle was used in all cases.

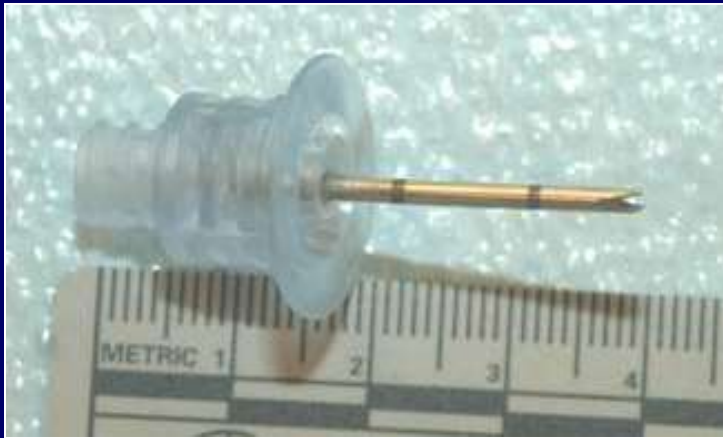
*Data are based on cases with an IO-IV needle present at autopsy June 2010 through May 2011.

Humeral Interosseous IV's



Standard placement is in the proximal humerus anteriorly or laterally.





IO-IV devices of this type may be inserted with a power driver (drill) or manually.

EZ-IO

1. EZ-IO® 15mm (3-39 KG), EZ-IO® 25mm (40 KG AND GREATER) AND EZ-IO® 45mm (EXCESSIVE TISSUE)

DEVICE DESCRIPTION: EZ-IO Needle Sets are comprised of a Safety Cap, a Stylet and a Catheter. When the Stylet is removed a standard Luer lock is exposed. Needle Sets are made of 304 Stainless and Catheters are 15 gauge. Needle Sets are provided sterile, non pyrogenic and in protective packaging. Needle Sets are intended for use with the EZ-IO Power Driver (Figure 1).



EZ-IO Power Driver and Needle Sets (FIGURE 1)

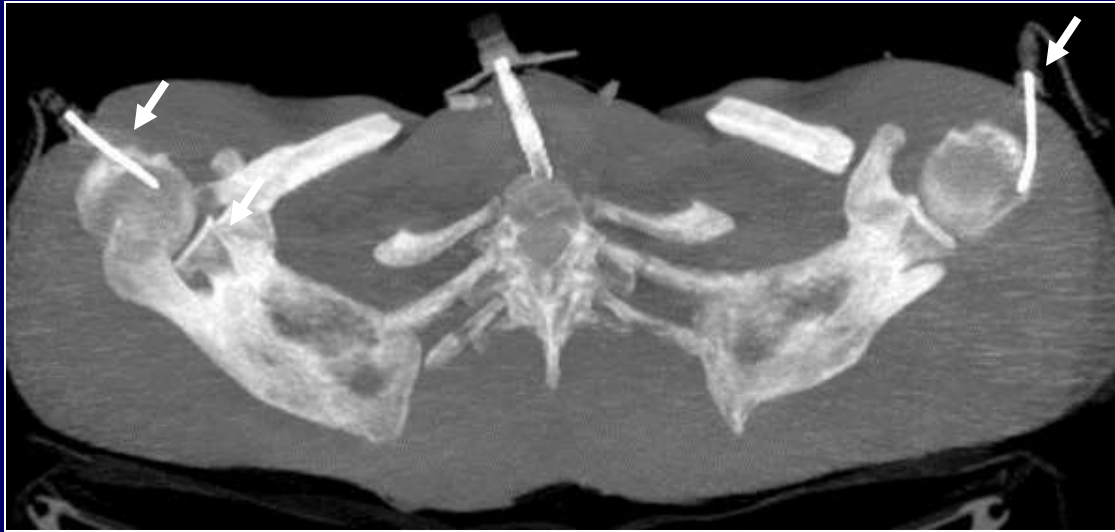


The 25 mm (blue hub) and 15 mm (pink hub) needles have a version which may be inserted manually.

The military does not receive a manual version of the 45 mm (yellow hub) device so insertion with a driver is assumed.



Postmortem CT at Dover provides an opportunity for assessment of Humeral IO-IV Position (Arrows)



Caution: Movement during transport may have affected position and configuration.

CASE SERIES:

19 cases where humeral IO-IV's were present at time of postmortem examination and CT imaging was performed

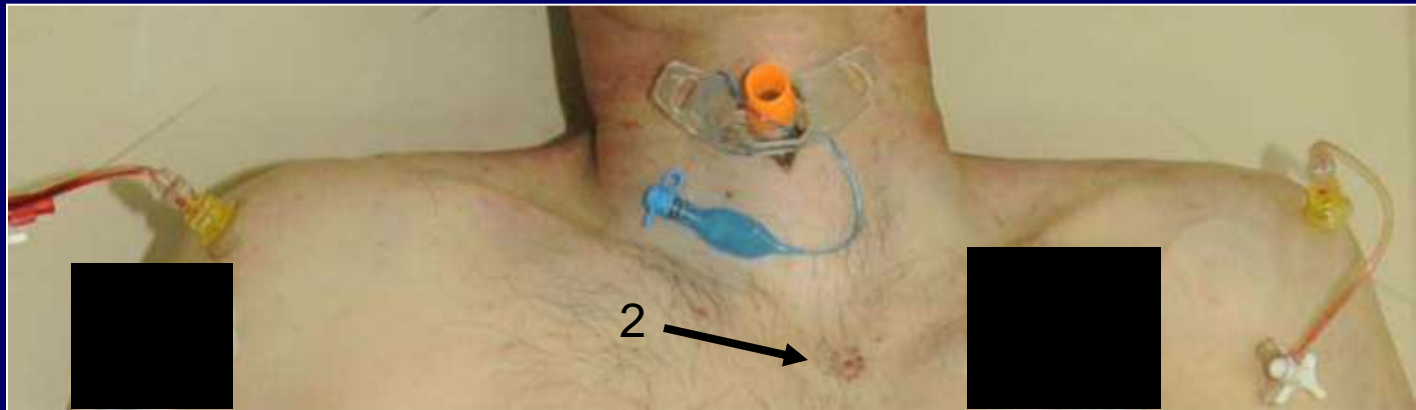
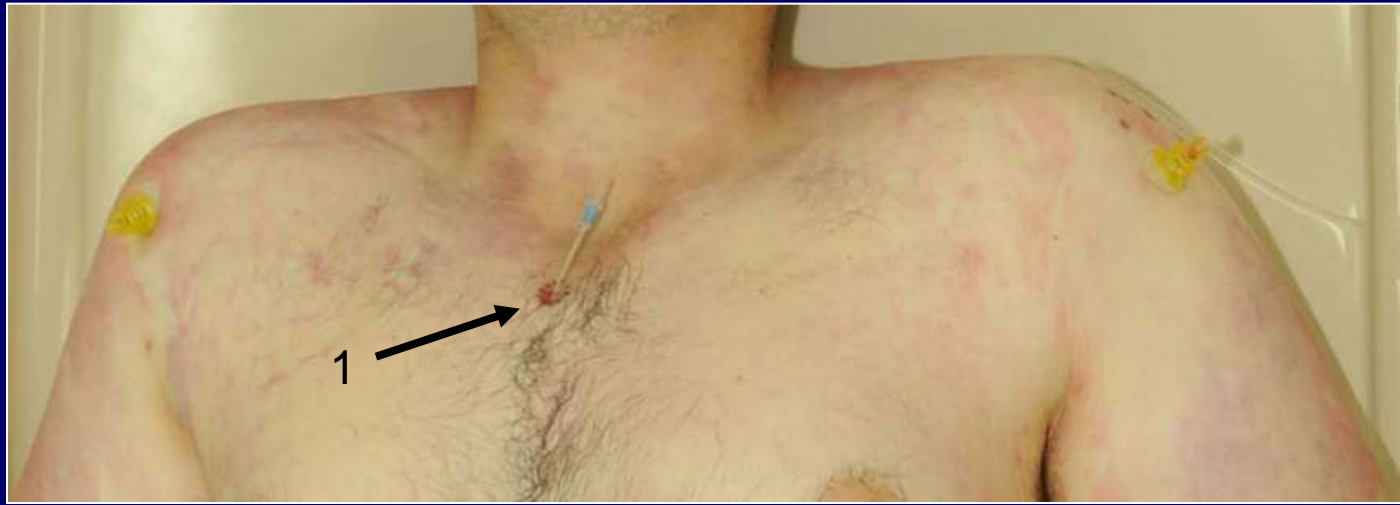
14 cases: 1 site

5 cases: 2 sites (Bilateral)

24 Humeral IO-IVs :

-12 Left, 12 Right

-21 Yellow (45 mm), 3 Blue (25 mm)



In 14 of 19 cases the humeral IO-IV's were in addition to another intraosseous device (1) [or attempt (2)], commonly the sternum.

CAUTION:

- This presentation makes no association between IO-IV position and outcome of treatment.
- The clinical circumstances and specific details surrounding the placement of the humeral device in these cases is unknown. Specifically we do not know if the power drill or manual technique was used.

ASSESSMENT:

Each humeral IO-IV was assessed for:

Tip Position-

- In Bone – Well Seated
- In Bone – Marginal Position
- Not in Bone

Location and Direction of Entry

Needle Bending



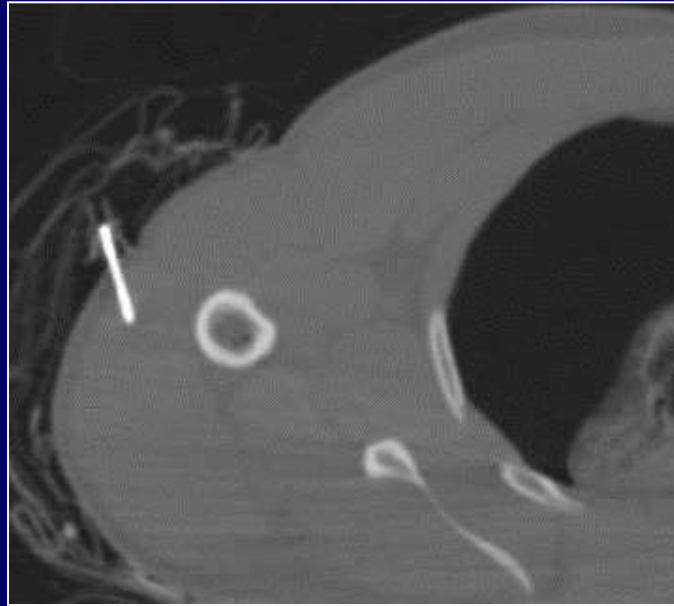
Right humeral needle
(45 mm Yellow) well
seated in bone. Note
downward bend of hub
(arrow).





Left humeral needle (45 mm Yellow) marginally seated with tip at the inner cortex. Note medial bend of hub (arrow).

Right humeral
IO-IV (25mm
Blue) not in
bone



RESULTS BY LOCATION

Location	In Bone Well Seated	In Bone Marginal Position	Not In Bone
Left Humerus	9	2	1
Right Humerus	7	2	3
Total	16	4	4

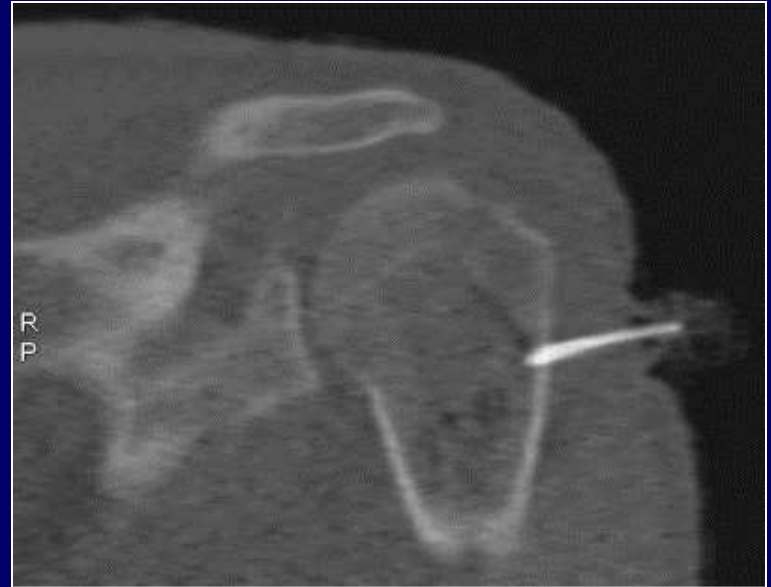
RESULTS BY DEVICE SIZE

Size	In Bone Well Seated	In Bone Marginal Position	Not In Bone
45 mm (Yellow)	16	3	2
25 mm (Blue)	0	1	2
Total	16	4	4



25mm (Blue Tip) IO-IV
needle is not long
enough to reach the
right humerus in this
individual.





25mm (Blue Tip) IO-IV
needle marginally
positioned in the
lateral cortex of the left
humerus.

SUMMARY

Based on a series of 24 humeral IO-IV placements it appears successful insertion (tip well positioned in the marrow) is more likely with a 45 mm (yellow) needle.

The 25 mm (blue) needle may not be suited for humeral insertion in some individuals due to soft tissue thickness.

Instructions from the manufacturer* contain a note that addresses tissue thickness and length of the needle.

Ensure at least 5 mm of needle is visible after touching bone.



IMPORTANT: Only handle Needle Set by the plastic hub.

IMPORTANT: Control the patient's movement prior to and during Needle Set insertion.

- Position Driver at insertion site with Needle Set at a 90-degree angle to the bone. (Figure 6) **Gently** power or press Needle Set until Needle Set tip touches bone.
- Ensure at least 5 mm of the catheter is visible. (Figure 7)



FIGURE 6

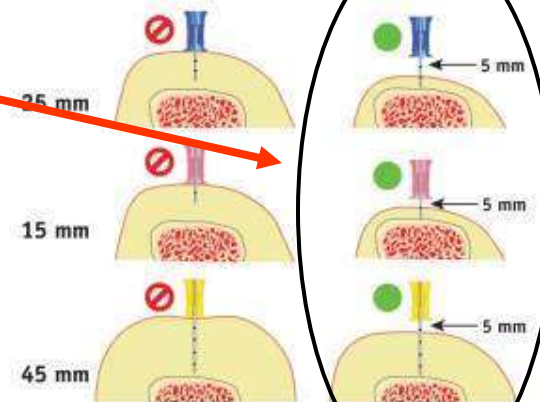


FIGURE 7

* Education and training materials available at Vidacare.com

FURTHER STUDY:

- This analysis assessed needle tip entry into the marrow cavity, it did not assess needle location and direction with respect to the proximal humeral landmarks.
- There are cases where the needle is above the surgical neck and cases where the needle is in a diaphyseal location. We are studying variability in placement and factors which affect position. (FT2F Part 2/2)

CAUTION:

- This presentation makes no association between IO-IV position and outcome of treatment.
- The clinical circumstances and specific details surrounding the delivery of emergency treatment in these cases is unknown.

DMMPO RECOMMENDATIONS / ACTIONS

- Services evaluate humeral IO-IV procedures and equipment
 - Which devices are being taught?
 - Review training techniques & procedures

FUTURE CONSIDERATIONS

- Guidelines for Placement
- Evaluate & Update Training Procedures

This material is intended for educational and training purposes. If portions are extracted, the following statement must be included:

“Source: Armed Forces Medical Examiner System and DHA Medical Logistics Division”

NOTES of CAUTION:

- The clinical circumstances and details surrounding emergency treatment in these cases is unknown
- This presentation makes no association between device placement and outcome of treatment
- This case series is drawn from cases with fatal injuries, which may skew data

For FT2F Comments / Questions / Requests:
Contact the Armed Forces Medical
Examiner System (AFMES)

Contact Information:

Lt Col Edward L Mazuchowski, USAF, MC
Office of the Armed Forces Medical Examiner

edward.l.mazuchowski.mil@mail.mil
(302) 346-8648