Venous access in children undergoing ITI

Ondřej Zapletal
Department Paediatric Haematology
University Hospital Brno

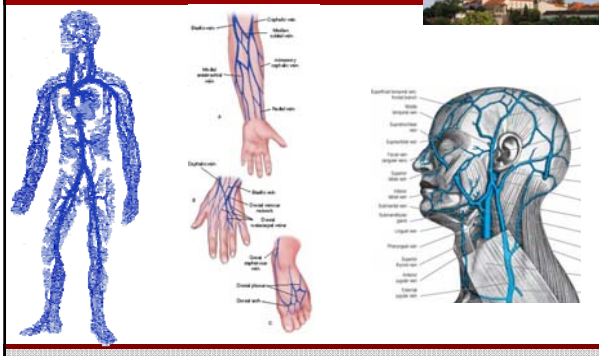
ITI

- ITI – different regiments
  - factor FVIII/FIX concentrates and/or by-passing agents administered i.v.
  - frequency from 3 x week to 2 x day
- sufficient and convenient venous access necessary!

I.v. routes

- peripheral vein
- central vein
  - central venous access devices
    - short time CVL
    - long time CVL
      - tunnelled
      - port-a-cath
- A-V fistula

Peripheral veins



Peripheral veins

- preferred if
  - large enough
  - sufficient number of available sites due to frequency of infusions
  - parents/caregivers are well trained
- low risk of
  - infection
  - thrombosis
- frequent changing of sites
  - to prevent skin and vessel wall scars

Peripheral veins

- 1 vein puncture a week
- inhibitors occurrence mainly in pre-school haemophilia patients
- 3-14 veins needed for ITI
  - usually not available in toddlers and pre-school boys

Peripheral veins

- painful venepuncture
- need for good compliance (“stillness“)
- local anaesthetics can help

EMLA crm 5%

- (lidocain+prilocain) **1-2 hours** prior puncture in occlusion

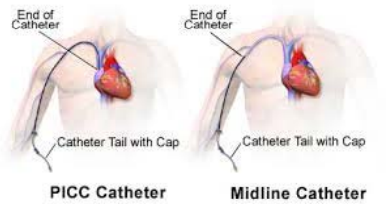
Peripheral veins

Gauge	24	22	20	18
mm	0,7	0,9	1,1	1,3

Vasofix inserted in a vein up to 72 hours

Peripherally Inserted Central Catheters

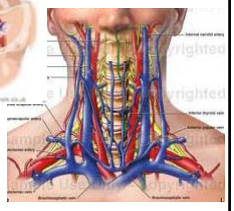
- higher risk of thrombosis
- lower risk of occlusion
- no data from haemophilia patients

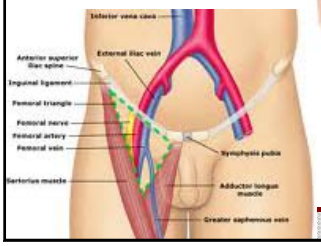


Central Venous Access Devices

jugular vein *(vena jugularis)*

subclavian vein *(vena subclavia)*

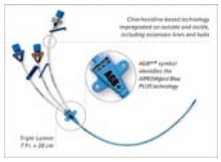


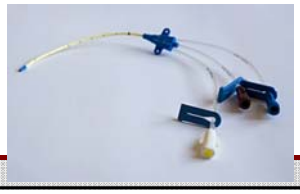


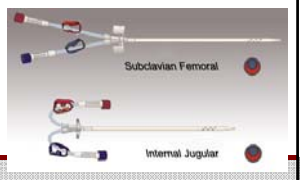
femoral vein *(vena femoralis)*

Central Venous Access Devices

- external short term use
  - up to 4 weeks
  - emergency situations
  - after surgery





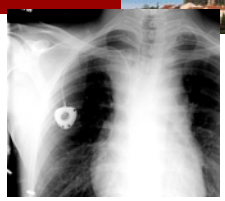


Central Venous Access Devices

- external long-term use
  - tunnelled
    - Hickmann, Broviac
  - risk of infection
  - risk of self extraction
  - sterile techniques
  - regular flushing
    - saline, heparin

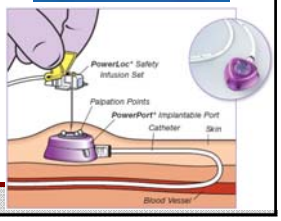
Central Venous Access Devices

- internal
  - ports (port-a-cath)



Central Venous Access Devices - Ports

- lower risk of infection
- longer life
- no risk of “self pulling“
- bathing possible
- **puncture with needle required**



CVAD infections

- exit site infection
- tunnel or pocket infection
- sepsis

CVADs: infection

- pooled incidence of infection 0,66/1000 catheter days
- factors associated with an increased risk of infection
  - presence of inhibitors
  - external lines
  - age 2-6 years
  - daily use
- reason for removal
  - 70% infection
  - 4% thrombosis

(Valentino et al, Heamophilia 2004)

- CVAD infection = lower ITI success

(I-ITI study)

- 81 CVADs, 3.36 years (0.22 - 9.44 years), Median age at first CVAD insertion 2.16 years (0.7- 14)
- Overall incidence of confirmed CVAD-related bloodstream infection 0.42 per 1000 CVAD days, incidence of confirmed and suspected CVAD-related infection 0.60 per 1000 CVAD days
- 73.7% successfully treated iv ATB without CVAD removal

(Yeoh et al, J Paediatr Child Health. 2013)

CVADs: thrombosis

- even in haemophilia patients
- asymptomatic
  - on CVL
  - mural
  - complete occlusion
  - risk of progression (VSC+VJI+VBC...)
- locus of infection

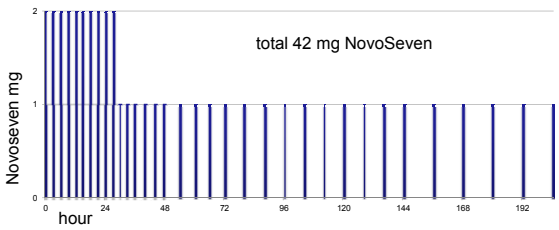
(Santagostino et al Blood Transfus 2008)

- 20 boys with haemophilia with total 27 CVADs
- MRI diagnosed DVT in 5 (25%), clinically silent, all inserted below 1 year
- no correlation between the duration or number of CVADs and DVT was detected. None of the patients had subjective symptoms of PTS

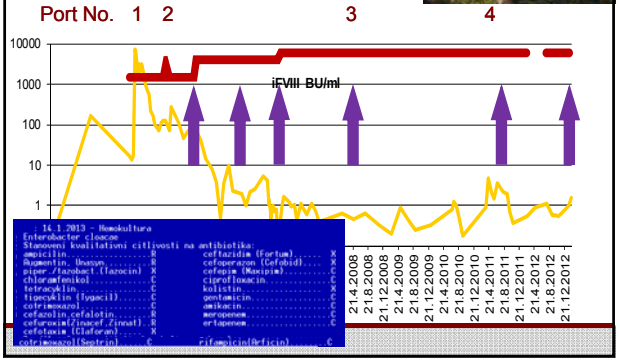
(Ranta et al, Haemophilia 2012)

Management of port insertion Kryštof, severe HA, HR iFVIII 35 BU/ml, 18 months

- Port-a-cath insertion for ITI, 12 kg
- rFVIIa NovoSeven 1 mg = 83 ug/kg 2 mg = 166 ug/kg
- + paraaminobenzoic acid



Adrian, severe HA, HR iFVIII
Ports for ITI

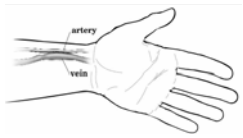


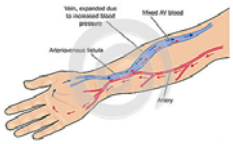
AV fistulas

- alternative to CVADs
- in haemophilia patients since 1999

(Santagostino et al BJH 2003)

- surgeon experience
- non-dominant upper limb preferred





AV fistulas

- data from Italy, USA, Austria
- 1 month to maturation
  - dilatation and arterialisation of the vein
- 82% successful maturation
- duration of use 1-7 years (median 5 years)

(Santagostino et al, BJH 2003, JTH 2007
McCarthy et al J Vasc Surg 2007)

AV fistulas

- complications
  - hematoma
  - distal limb ischemia
  - thrombosis of venous part
  - loss of patency
  - limb hypertrophy
  - aneurysmatic dilatation

Summary

Type	+	-
PV	no external device no surgery, no special care	not sufficient in small boys haematoma post puncture
External CVL	no needle immediate use percutaneous insertion	infection, thrombosis limited duration (year) self-displacement sterile techniques
Internal CVL	longer duration (years) no physical activity limits	surgical insertion infection, thrombosis needles, skin erosion sterile techniques
AVF	no infection, no special care longer duration (years) no physical activity limits	surgical construction delayed use AVF complications

Conclusions

- adequate venous access is one of basic condition for successful ITI
- peripheral vein is a best option
- CVAD or AV fistulas are possibilities
- individual approach to patient

Future

- long acting drugs
- s.c. formulations
- p.o. formulations