

Central Venous Catheter Insertion Training Simulator

Introduction for CVC Training with Simulator

M93-U

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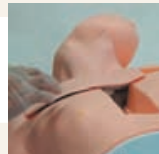
Laboratory training with Simulator

Complementary/further learning

Laboratory training with Simulator

I : General knowledge

Before the laboratory training, learn and understand 1) relevant anatomy, 2) approaches and 3) common complications, based on observation of the transparent model of the upper right chest (cannulation pad) and palpation of puncture pad.



II : Simulation

1: General planning

Draft the surgical plan and affirm the procedures.

2: Preparation

Prepare necessary instruments and practice the precaution procedures.

3: Assessment and planning the puncture.

Training using the simulator with the puncture pad

Land marks and puncture site

Positioning to prevent air embolism and other complications

Proper insertion depth of the catheter.

4: Puncture and Cannulation

Puncture

Disinfection area and the procedure

Aseptic procedures

Position, direction and depth of puncture

Feeling through the needle

Identify a successful procedure.

Simulate failed procedures (complications).

Cannulation

Skills for proper placement, feeling of VW through the catheter.

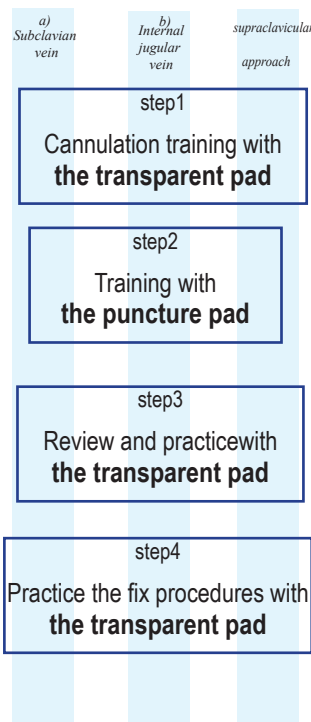
Mislodging and how to avoid it.

5: Ultrasound guided CVC

6: Maintenance of the insertion site and

TPN patient care

- 1) Replacement of the dressing films
- 2) Disinfection



Complementaly and further learning

Other approaches
External jugular vein catheterization
Femoral venous approaches
Cut-down approaches
Non-mechanical complications
Infectious complications
Thrombotic complications

Variation of instruments and equipments

Ultrasound guidance

Other options of patient positioning
Other complications
Hemothorax, hematoma, nerve damage, TD damage, air embolism

Confirmation by radiography
Suturing skills

Features and Educational and Medical reasons for using a CVC insertion training simulator

The simulator is designed to facilitate obtaining reliable CVC skills and prevent complications.

- A) Three-dimensional anatomical understanding
- B) Repetitive opportunities for realistic hands-on training, providing life-like experience
- C) Ultrasound guided CVC procedure simulation
- D) Simulation of thorough clinical procedure.

A) Anatomy

The torso manikin: modeled from an actual person, 166cm (5.4feet) tall and 66kg(145.5 pounds) weight.

The puncture pad and transparent cannulation pad include following anatomical structures;

Veins: subclavian vein, internal jugular vein, superior vena cava

Arteries: subclavian artery, carotid artery

Bones; clavicle, first rib, second rib, episternum

Lung

The route and depth of veins and arteries, the vessel diameters and the positional relationship of anatomical structures are based on clinical CT and MRI data with reference to anatomical charts (Netter, Topographische Anatomie des Menschen: Eduard Pernkopf). The clinical data are those of a person with typical anatomy chosen from numerous actual examples.

The transparent (cannulation) pad facilitates a visual understanding of the three dimensional anatomy.

The puncture pad provides very life-like tactil sensarions of each structure, soft tissues, VW and bones. That allows palpation of the sites and facilitates getting a feel for them through the needle and catheter.

B) Effective hands-on training

Three common, important approaches are available for training

Subclavicular approach , Internal jugular vein approach, Supraclavicular approach

Proper physical land marks and palpable pulse of the carotid artery provide practice in finding puncture sites.

Life-like material of the puncture pad allows the training in palpation and getting the feeling through the needle.

Successful and failed procedures are shown instantly.

Success:

Puncture: simulated blood (blue fluid) is aspired

Cannulation: Catheter tip is observed through SCV window.

Failure (Common complications):

Artery puncture: red fluid is collected to syringe.

Pneumothorax: Air is aspired into syringe.

Mislodging: Catheter tip is observed through windows.

Pads are interchangeable and replaceable by simple maneuver, allowing repetitive training.

Space-saving design facilitates frequent training and easy storage.

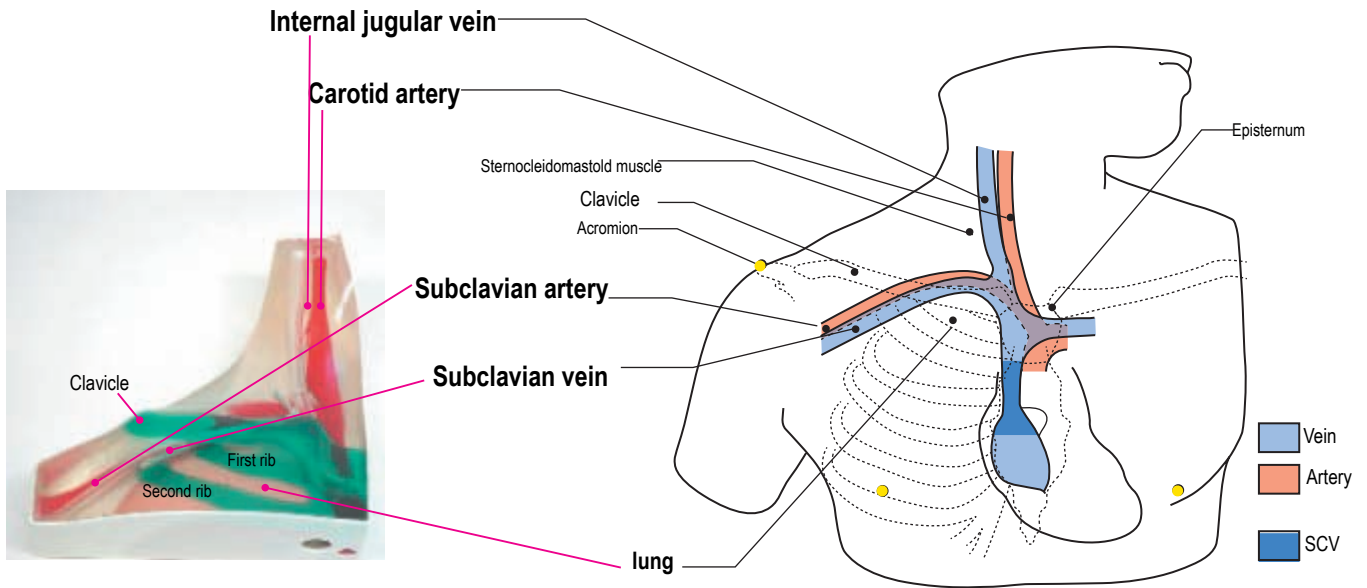
C) Ultrasound guided CVC procedure simulation

By the ultraound puncture pad, distinction between carotid artery and internal jugular vein as well as puncturing procedure under the ultrasound scanning can be practiced.

D) Thorough simulation

By interchanging 3 kinds of pads, thorough training in related procedures including insertion site maintenance is possible.

I General Knowledge----1) Relevant anatomy



The transparent anatomical block can be observed from multiple direction. Place the model into the torso and observe the relative locations. Touch the puncture pad and palpate the bones under skin and muscles.



The route and depth of veins and arteries, the vessel diameters and the positional relationship of anatomical structures are based on clinical CT and MRI data with reference to anatomical charts (Netter, Pernkopf). The clinical data is of a person with typical anatomy chosen from numerous actual examples.
 Internal vessel diameter: 8mm
 External vessel diameter: 10mm



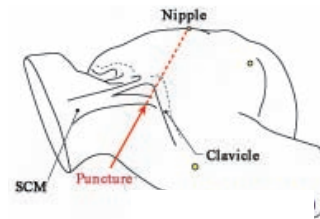
The vessel tube of SCV extends to the depth of the valva tricuspidalis.

I General Knowledge----2) Approaches and catheter routes

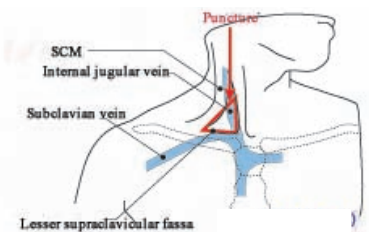
Subclavian vein catheterization



Supraclavicular approach



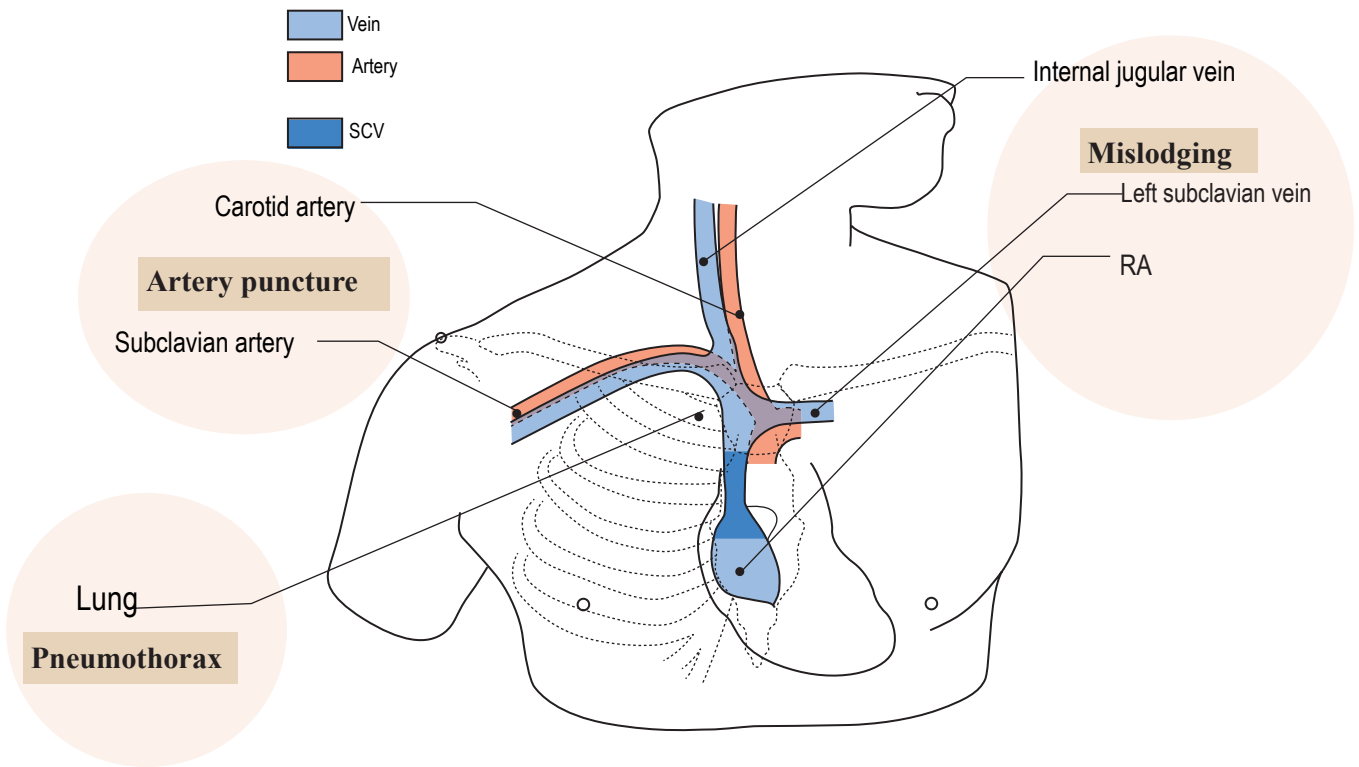
Internal jugular vein catheterization



Central venous approaches	
Puncture	Subclavian vein
	Internal jugular vein
	Supraclavicular approach
	External jugular vein
	Basilic vein
	Femoral vein
Cut-down	Cephalic vein
	Basilic vein
	External jugular vein
	Facial vein
	Internal jugular vein

The three most common approaches for adult patient that can be practiced with the simulator.

I General Knowledge----3) Common mechanical complications accompanied with puncture



In case the needle reseaches an artery, red fluid will be collected.

If the needle reaches the lung, the syringe will aspirate air.

When the catheter is inserted into the left subsclavian vein, it will be observed through window.

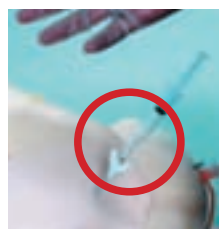
Artery puncture



Subclavian artery

Carotid artery puncture

Pneumothorax



Mislodging



Other complications

- | | |
|--------------------------|-----------|
| Hemothorax | Hematoma |
| Nerve damage | TD damage |
| Air embolism | |
| Infectious complications | |
| Thrombotic complications | |

II Simulation----1. General planning, 2. Preparation & 3. Assessment and planning the puncture

1. General planning:

Draft the surgical plan based on the provided condition of simulated patient.
Affirm the necessary procedure.

2. Preparation:

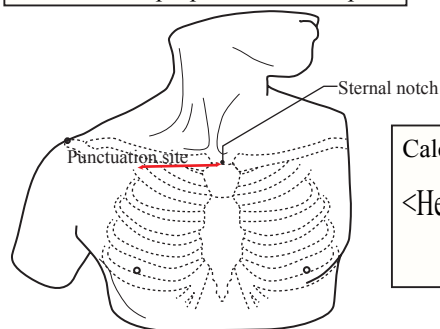
- 1) Environmental safety
- 2) Maximal Sterile-barrier precaution
A mask, a cap, a sterile gown, sterile gloves and a large sterile-drape
- 3) Preparation of instruments and equipments
Disinfection equipments and **disinfectant**
Anesthetic
Suture instruments
Sterile cloth
Syringe, needle and **physiologic saline**
CVC
Instillation equipment
Straps, dressing films
Operation sheets

NOTE: The trainer is not designed for the use of larger catheters. Use the supplied CVC or thinner needles.
Actual medical fluids can not to be used with the simulator. Simulate fluid using water, or skip the procedure.

3) Assessment and planning the puncture

The simulated patient is 166 cm (5.4 feet) tall, and weight 66kg.

Calculate the proper insertion depth



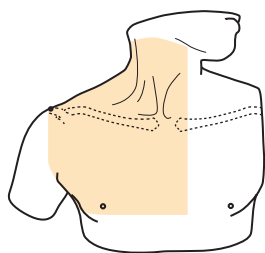
Calculation of insertion depth (cm) Left Subclavian catheterization

$\langle \text{Height of the patient} \rangle \times 0.07 - 5 + \langle \text{Length between the sternal notch and the puncturing site} \rangle$

II Simulation----4. Disinfection

Positioning of the patient

Chest: shoulders back, chest out posture
Arms: should be laid naturally stretched beside body or put the hands on the abdomen.
Body: keep in Trendelenburg position.



Disinfecting area

Disinfection (skin preparation) should covers the area from the neck to under the areola, from the anterior axillary line to the left side (or opposite side from the puncture site) of the sternum.

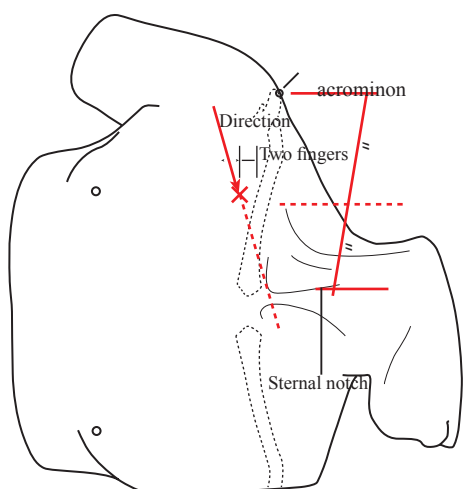
Practice

Understand the area on the torso model.
Cleanse the area with alcohol (mimic with water)
Disinfect the area with chlorhexidine alcohol or povidone-iodine (mimic with water)
Then spread the sterile cloth

Disinfection area

NOTE: Actual disinfectant may cause defacement of the simulator. Perform the practice with water.

II Simulation---- 4 a) Making a puncture *Subclavian vein catheterization*



step1

Cannulation training with
the transparent pad

step2

Training with
the puncture pad

step3

Review and practice with
the transparent pad

step4

Practice the fix procedures with
the transparent pad

Subclavian vein catheterization

1. Test puncture (anesthesia)

- 1) Identify the puncture site, at the point two fingers under the midpoint between the acromion and the interior end of clavicle.

NOTE: The acromion end of the clavicle is marked on the manikin. Feel and find the interior end of clavicle.

- 2) Prepare the syringe and needle.

NOTE: In the simulation training, skip the anesthesia. Practice with an empty syringe.

- 3) Insert the needle slowly, aiming slightly cephalad of the sternal notch, keeping the needle approx 10 degrees from the skin, until the needle reaches the clavicle.
- 4) Drawback the needle slightly and let it slowly penetrate under the clavicle, raising the needle gradually to 15 degrees from the skin.
- 5) When the needle tip passes under the clavicle, penetrate further, slowly lowering the needle to 10 degrees again, pulling the inner syringe gently.
- 6) When the needle reaches properly into the vein;
The change in pressure will be felt through the needle.
An aspiration of the simulated blood (blue fluid) will be observed.
- 7) In cases the needle reaches wrong place, the error will be shown in the following ways.
Artery puncture: The syringe collects red fluid.
Pneumothorax: The syringe will aspirate air.
In case failure occurs repeatedly, go back to observation of the anatomical model and start again.
- 8) Having observed the proper flash-back, note the depth and degree of the needle at the right position, then withdraw the needle.

2. Catheterization

Make a puncture with CVC, aiming the point that was confirmed by the test puncture. When the needle reaches the vein, make sure the needle top is properly placed into the vessel by pulling and pushing the cylinder.

In actual procedure;

Local anesthesia should be administered on making test puncture.

- 1) Make a wheal at puncture site before inserting the needle.
- 2) Sufficiently anesthetize the area around the clavicle
- 3) Continue injecting anesthetic while the needle is inserted from the clavicle to the vein.

II Simulation---- 4a) Cannulation *Subclavian vein catheterization*



Demonstration



Wire insertion practice with transparent block and skin



Wire insertion with landmark puncture pad

Transparent cannulation block markedly facilitates the training.

3. Cannulation

- 1) Quickly, pull the syringe off the needle and insert the catheter, avoiding aspiration of air.

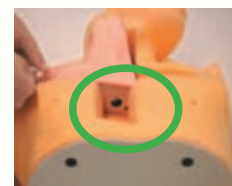
NOTE: During actual surgery, ask the patient to hold his/her breath during insertion.

- 2) Insert the catheter into SCV.

The life-like feeling of the vessel wall facilitates obtaining the insertion skills.

NOTE: For subclavian catheterization during actual surgery, changing the position of the patient after the catheter has been inserted 5cm facilitates the proper insertion. Turn the neck of the patient to the side of CVC site and bend it deeply toward the shoulder. This helps to avoid mislodging in the internal jugular vein.

When the catheter is correctly inserted superior vena cava, it is directly observed through the SCV window.



When the catheter is inserted into the left subclavian vein, it will be observed through subclavian window.



When the catheter turns upward into internal jugular vein, it won't be seen through any of the windows.

Attention: Do not remove the external tube (cover) from the catheter while practicing with the puncture pad. Otherwise, the guide wire will cause damage to the pad.

NOTE: Although it is possible to demonstrate the full procedure including insertion of the catheter into SVC, we highly recommend making use of the durable transparent cannulation block for frequent insertion training, in order to maintain the durability of the puncture pad.

- 3) Fix the catheter.

NOTE: Skip the suturing procedure in the training with the simulator.

- 4) Connect the CVC to the infusion route.

NOTE: Use empty infusion route for practice.

During actual surgery, the proper catheter position should be confirmed by radiography.

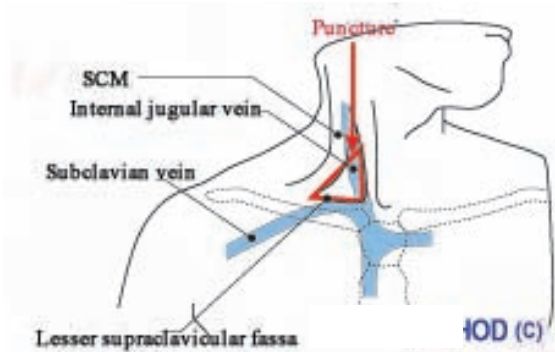
- 5) Disinfection the CVC site.

- 6) Fix the infusion tube to the skin with adhesives and cover with dressing films.

In actual procedure; If the puncture is not successful,

- 1) Adjust the position of the patient.
- 2) Try the Valsalva maneuver.
- 3) Change operators.
- 4) Try from the opposite side, change the site or change to a cut-down approach.

II Simulation---- 4b) Making a puncture *Internal jugular vein catheterization*



step1

Cannulation training with
the transparent pad

step2

Training with
the puncture pad

step3

Review and practicewith
the transparent pad

step4

Practice the fix procedures with
the transparent pad

Internal jugular vein catheterization

Three routes are known to approach the internal jugular vein. Routes (1) and (2) are commonly adopted. The route (1) can be practiced with the simulator.

- 1: puncture site at the top of the lesser supraclavicular fossa
- 2: puncture site at the anterior border of the sternocleido-mastoid muscle
- 3: puncture site at the posterior border of the sternocleido-mastoid muscle

The positioning of the patient is similar to that for the subclavian catheterization, turning the face to opposite side from the puncturing side.

1. Test puncture (anesthesia)

- 1) Identify the puncture site. First, find the top of the lesser supraclavicular fossa, the triangle formed by the 2 ends of sternocleido-mastoid muscle. (Approx 5-7cm upper from the superior border of the clavicle.) Second, palpate the pulse of the carotid artery with the index finger. Then, identify the point near the top of the triangle slightly exterior to the site where the artery pulse was felt.
- 2) Prepare the syringe and needle.
NOTE: In the simulation training, skip the anesthesia. Practice with an empty syringe.
- 3) Insert the needle slowly, following the direction of the surface side of the sternocleido-mastoid muscle, aiming at the right nipple, keeping the needle at an angle approx 30s degree from the skin.
- 4) If the puncture is properly made, the needle will reach the veins soon. The average insertion length is 3-4 cm for adults.
In case the needle penetrate too deeply, try to draw the syringe out slowly, pulling the inner cylinder gently. Aspiration of the simulated blood may be observed during this maneuver.
- 5) When the needle reaches the vein properly;
A change in pressure will be felt through the needle.
Aspiration of simulated blood (blue fluid) will be observed.
- 6) If the needle reaches the wrong place, it will be shown in the following ways.
Artery puncture: the syringe collects red fluid.
Pneumothorax: the syringe will aspirate air

In case failure occurs repeatedly, go back to the observation of anatomical model and try again.

2. Catheterization

Make a puncture with CVC, aiming at the point that was confirmed by a test puncture.

When the needle reaches the vein, make sure the needle tip is properly positioned in the vessel by pulling and pushing the cylinder.

II Simulation---- 4b) Cannulation *Internal jugular vein catheterization*



Demonstration



Wire insertion practice with transparent block and skin



Wire insertion with landmark puncture pad

Transparent cannulation block markedly facilitates the training.

3. Cannulation

- 1) Quickly, pull the syringe off the needle and insert the catheter, avoiding aspiration of air.

NOTE: During actual surgery, ask the patient to hold his/her breath during insertion.

- 2) Insert the catheter into SCV.

The life-like feeling of the vessel wall facilitates obtaining the insertion skills.

When the catheter is correctly inserted superior vena cava, it is directly observed through the SCV window.

When the catheter is inserted into the left subclavian vein, it will be observed through subclavian window.

Attention: Do not remove the external tube (cover) from the catheter while practicing with the puncture pad. Otherwise, the guide wire will cause damage to the pad.

NOTE: Although it is possible to demonstrate the full procedure including insertion of the catheter into SVC, we highly recommend making use of the durable transparent cannulation pad for frequent insertion training, in order to maintain the durability of the puncture pad.

- 3) Fix the catheter.

NOTE: Skip the suturing procedure in the training with the simulator.

- 4) Connect the CVC to the infusion route.

NOTE: Use empty infusion route for practice.

During actual surgery, the proper catheter position should be confirmed by radiography.

- 5) Disinfection the CVC site.

- 6) Fix the infusion tube to the skin with adhesives and cover with dressing films.

In actual procedure;

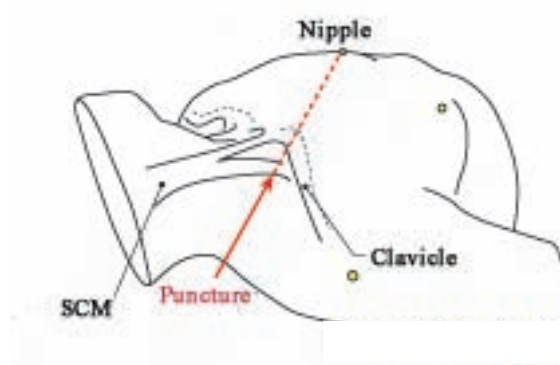
Local anesthesia should be administrated on making the test puncture.

- 1) Make a wheal at puncture site before inserting the needle.
- 2) Continue injecting anesthetic while the needle penetrates to the vein.

If the puncture is not successful,

- 1) Adjust the position of the patient.
- 2) Change operators.

II Simulation---- 4c) Performing a puncture by the *Supraclavicular approach*



step1

Cannulation training with
the transparent pad

step2

Training with
the puncture pad

step3

Review and practice with
the transparent pad

step4

Practice the fix procedures with
the transparent pad

Supraclavicular approach

1. Test puncture (anesthesia)

- 1) Identify the puncture site, at the point on the external side near the end of the sternocleidomastoid muscle, one finger up from the upper edge of the clavicle.
- 2) Prepare the syringe and needle. Use a shorter needle for the test puncture.
NOTE: In the simulation training, skip the anesthesia. Practice with an empty syringe.
- 3) Insert the needle slowly, aiming at the left nipple.
- 4) If the puncture is properly made, the needle reaches the vein very quickly. The average insertion length is 2-3 cm for adults, approx 1 cm for infants.
In case the needle does not reach the vein within that length, withdraw and try again.
- 5) When the needle penetrated the vein properly;
The change in pressure will be felt through the needle.
A flash back of the simulated blood will be observed.
- 6) In cases the needle reaches the wrong place, it will be shown in the following ways.
Artery puncture: red fluid is collected by the syringe.
Pneumothorax: the syringe will aspirate air.
If failure occurs repeatedly, return to observation of anatomical model and try again.

2. Catheterization

Make a puncture with CVC, aiming at the point that was confirmed by the test puncture.
When the needle reaches the vein, make sure the needle tip is properly positioned in the vessel by pulling and pushing the cylinder.

This approach causes fewer pneumothorax incidents in comparison with subclavian vein catheterization and is often adopted for emergency surgery and pediatric cases. The disadvantage involves fixing of the catheter. An Anterior tunneling routes will be recommended.

II Simulation---- 4c) Cannulation *Supraclavicular approach*



Demonstration



Wire insertion practice with transparent block and skin



Wire insertion with landmark puncture pad

Transparent cannulation block markedly facilitates the training.

5. Cannulation

1) Quickly, pull the syringe off the needle and insert the catheter, avoiding aspiration of air.

NOTE: During actual surgery, ask the patient to hold his/her breath during insertion.

2) Insert the catheter into SCV.

The life-like feeling of the vessel wall facilitates obtaining the insertion skills.

When the catheter is correctly inserted superior vena cava, it is directly observed through the SCV window.

When the catheter is inserted into the left subclavian vein, it will be observed through subclavian window.

When the catheter turns upward into internal jugular vein, it won't be seen through any of the windows.

Attention: Do not remove the external tube (cover) from the catheter while practicing with the puncture pad. Otherwise, the guide wire will cause damage to the pad.

NOTE: Although it is possible to demonstrate the full procedure including insertion of the catheter into SVC, we highly recommend making use of the durable transparent cannulation pad for frequent insertion training, in order to maintain the durability of the puncture pad.

3) Fix the catheter.

NOTE: Skip the suturing procedure in the training with the simulator.

4) Connect the CVC to the infusion route.

NOTE: Use empty infusion route for practice.

During actual surgery, the proper catheter position should be confirmed by radiography.

5) Disinfection the CVC site.

6) Fix the infusion tube to the skin with adhesives and cover with dressing films.

In actual procedure;

Local anesthesia should be administered during the test puncture.

1) Make a wheal at the puncture site before inserting the needle.

2) Continue injecting anesthetic while the needle penetrates from the clavicle to the vein.

When the puncture does not succeed,

3) Adjust the position of the patient.

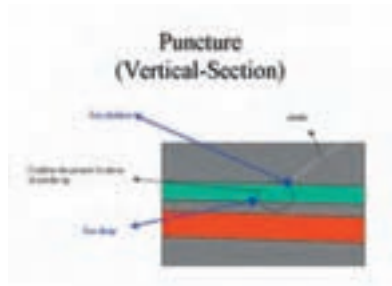
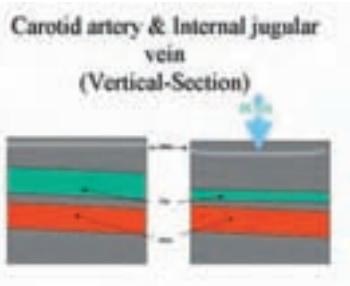
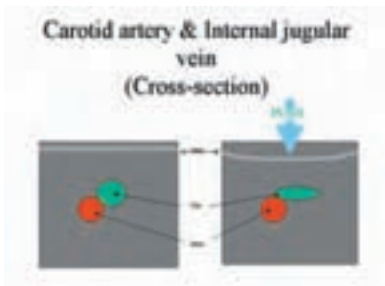
4) Change operators.

5) Try from opposite side, change the site or change to a cut-down approach.

II Simulation---- 5 Ultrasound guided CVC procedure *Internal jugular vein approach*



By using the Ultrasound puncture pad, ultrasound guided CVC insertion procedure can be simulated.



II Simulation---- 5 Maintenance

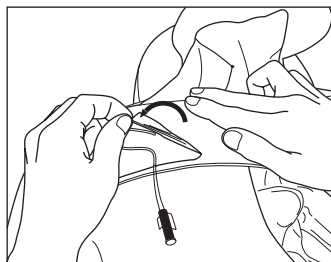
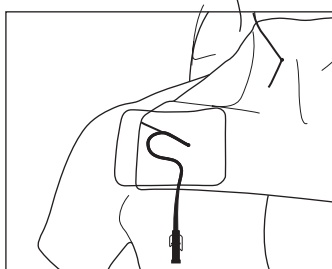
6. Maintenance of the insertion site and TPN patient care.

With the transparent pad and skin sheet, following procedures can be practiced.

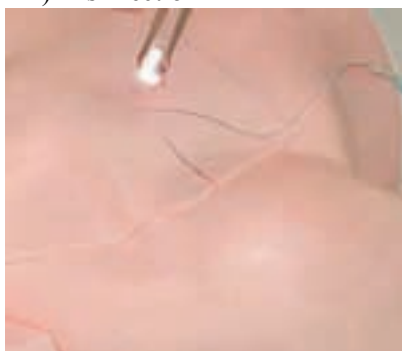
- 1) Replace of the dressing film
- 2) Disinfection

NOTE: Actual disinfectant may cause defacement of the simulator. Perform the practice with water.

- 1) Replace of the dressing film



- 2) Disinfection





KYOTO KAGAKU INFORMATION

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Central Venous Catheter Insertion Training Simulator

Instruction Manual

M93-U



KYOTO KAGAKU co.,LTD

M93U CVC Insertion Training Simulator

The simulator is designed for training in CVC procedures. Do not use for improper purpose.

Please read the instruction carefully before use.

Do not use the simulator in a way other than hereinafter prescribed by manufacturer.

Otherwise warranty from the manufacturer will not be extended.

The simulator comes with 2 kinds of training pads for relevant area.

<Pads names and functions>

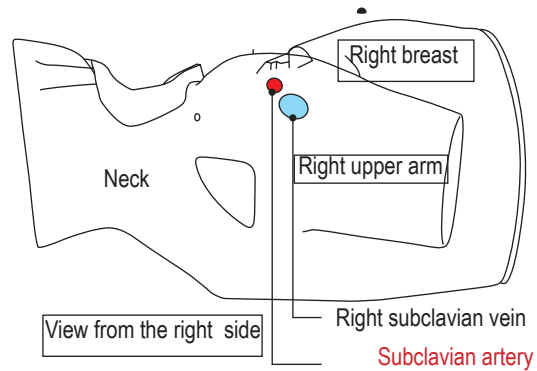
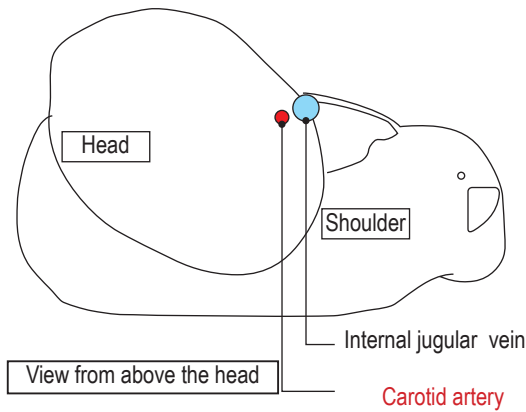
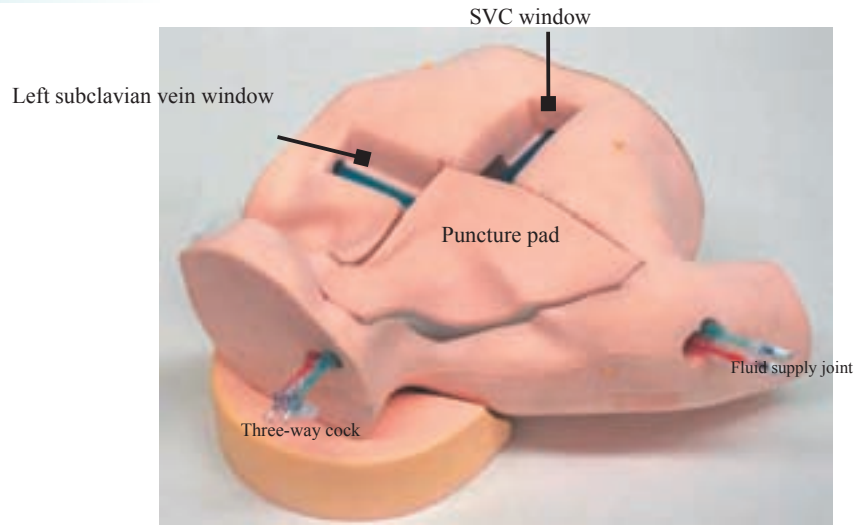
	Subclavian Vein	Subclavian Artery	Jugular Vein	Carotid Artery	Bones	Lung
Landmark Puncture Pad	Puncturable	Puncturable	Puncturable	Puncturable Pulsation possible	Palpable	Puncturable
Ultrasound Puncture Pad	N/A	N/A	Puncturable	Puncturable (non-pulsation)	Palpable	Puncturable
Transparent Cannulation block	Shown Accessible by guide wire	Shown	Shown Accessible by guide wire	Shown	Shown	Shown

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Landmark pad: Before training -----	P.4, 5
Preparation of simulated blood	
Filling the model with the simulated blood	
Landmark pad: While/After training -----	P.6, 7
Replacement of landmark pads	
Discharge the simulated blood	
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Ultrasound pad: While training -----	P. 12
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Discharge the simulated blood	
Replacement of ultrasound pads	
Cleaning and maintenance of the skin	
Troubleshooting -----	P.17
DOs and DON'Ts -----	P.18

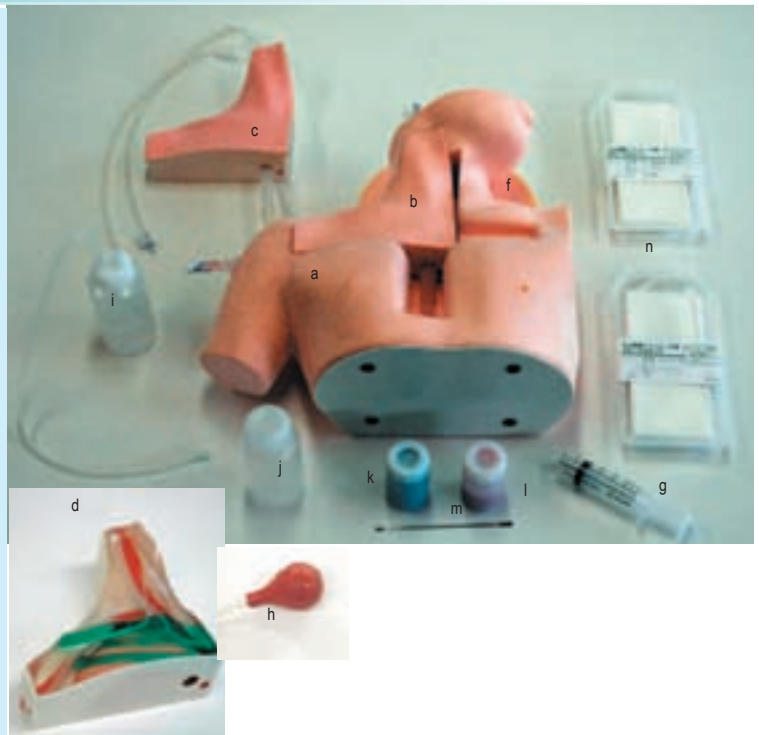
Part names and functions

Male upper torso with puncture pad

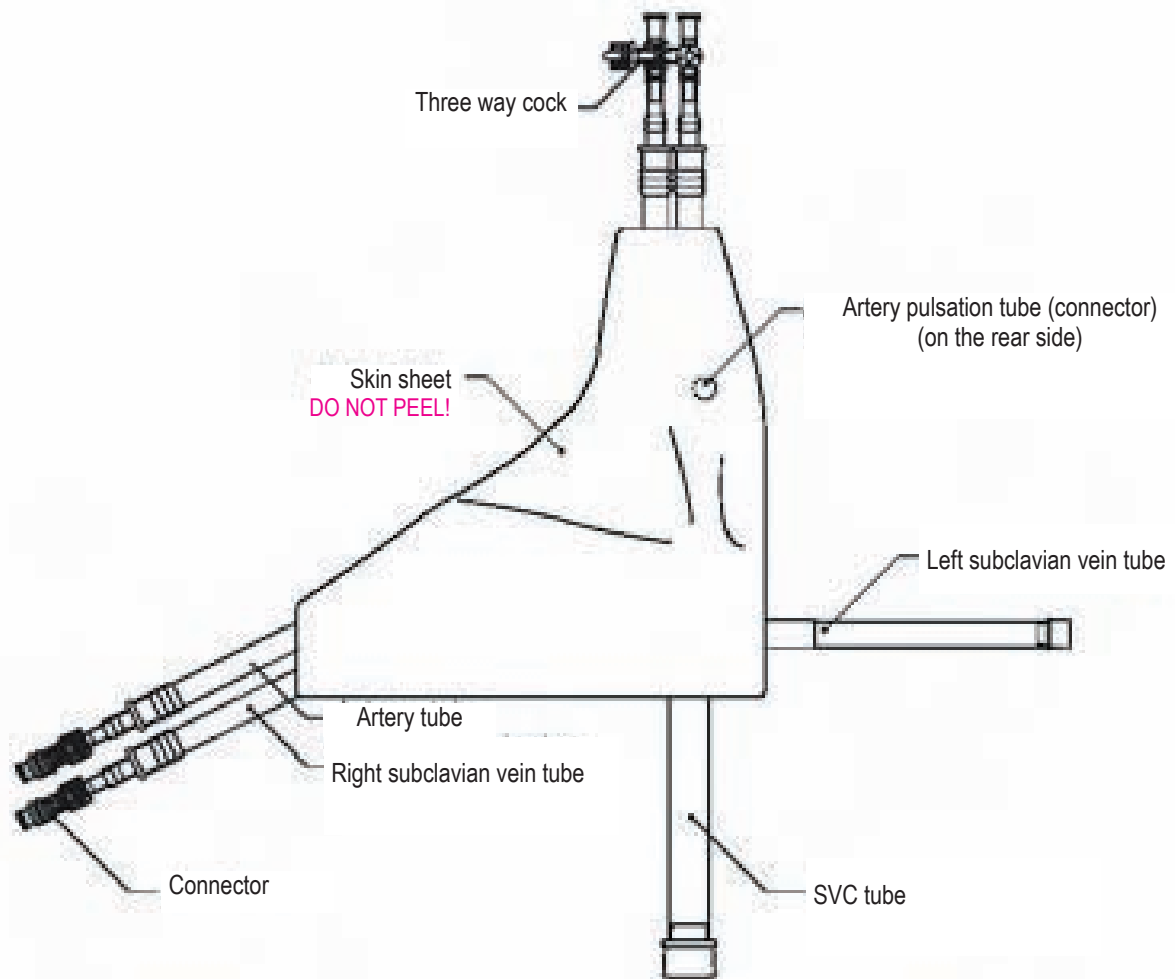


Set includes

- a. Male upper torso-----1
- b. Landmark puncture pad-----1
- c. Ultrasound puncture pad-----1
- d. Transparent cannulaion block-1
- e. Skin for cannulation training--1
(no picture)
- g. Syringe for fluid supply-----1
- h. Bulb for pulsation-----1
- i. Fluid supply bottle-----1
- j. Plastic bottle-----1
- k. Blood powder (blue)-----1
- l. Blood powder (red)-----1
- m. Spoon-----1
- n. CVC -----2
- o. Storage and transport case ---1
(no picture)



Landmark pad: Before training A1-A4



< Fill the artery tube.>

A1. Preparation of red fluid

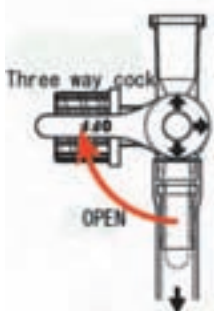
1) Take red blood powder to the tip of the small spoon provided in the set.

Please note: Only a tiny pinch of the powder is enough for coloring. Do not put too much amount at a time.

2) Dissolve it in half a jar of water. (approx 200cc)

Please note: The solution is not designed for prolonged storage.

Please prepare new simulated blood for each session.



A2. Filling the artery tube with red fluid

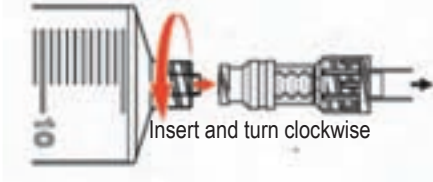
1) Open the three way cock.

CAUTION: MAKE SURE TO OPEN THE COCK BEFORE START FILLING THE FLUID. OTHERWISE EXCESSIVE PRESSURE MAY CAUSE DAMAGE TO THE PAD.

Landmark pad: Before training A1-A4



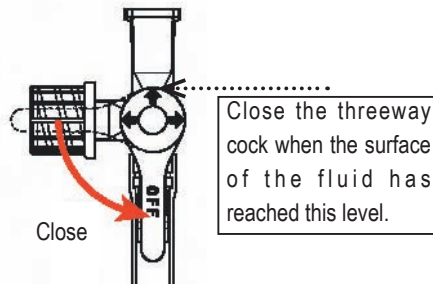
2) Fill the syringe with red fluid and connect the syringe tip to the fluid supply joint.



3) Slowly fill the artery tube with the red fluid until the surface reaches to the three way cock at the head side.



4) Close the three way cock.



5) Disconnect the syringe tip from the fluid supply joint

WE RECOMMEND DOING THESE PROCEDURES ON THE SINK AND PERFORM EACH STEP SLOWLY AND CAREFULLY.

THE COLORE FLUID ABSORBED BY THE BODY TORSO WOULD BE DIFFICULT TO REMOVE.

<Fill the vein tube>

A3. Preparation of blue fluid

- 1) Take a spoon of blueblood powder with the small spoon supplied .
- 2) Dissolve it in half a jar of water. (approx 200cc)

PLEASE NOTE: The solution is not designed for prolonged storage. Prepare new fluid each session.

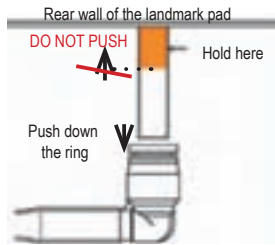
A4. Filling the vein tube with blue fluid

- 1) Open the three way cock.
- 2) Fill the syringe with blue fluid and connect the syringe tip to the fluid supply joint.
- 3) Slowly fill the vein tube with the blue fluid.
To fill the tube completely, remove the air by tilting the torso.
- 4) Close the three way cock.
- 5) Disconnect the syringe tip from the fluid supply joint.



Now, simulator is ready for practice. Lay down the torso and start training.

Landmark pad: Replacement of Landmark pads B1-B2



B1. Detach the puncture pad from the simulator.

- 1) Take off the parts at the shoulder and the jaw.
- 2) Remove the puncture pad from the torso.
- 3) Disconnect the pulsation unit from the pad.

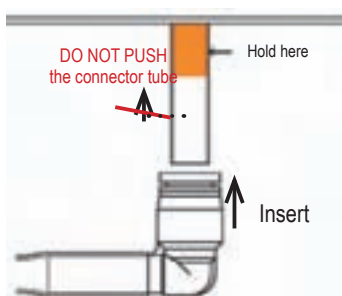
The tube can be disconnected by pushing the stopper ring toward the connector.

CAUTION:

Be careful NOT to push the connector tube tip toward the puncture pad. The pressure may cause damage to the soft structure of the puncture pad.



Rear wall of the landmark pad



B2. Set up a new landmark puncture pad.

- 1) Attach the pulsation unit to the connector tube at the rear wall of the landmark pad.
- 2) Place a new pad to the cavity, noting its direction.

Caution: Do not push the connector tip from the pad toward the pad wall.

Please note:

Make sure that the tubes are not folded or tucked between walls of the pad and the body torso.

The simulator doesn't work properly when the tubes are folded.

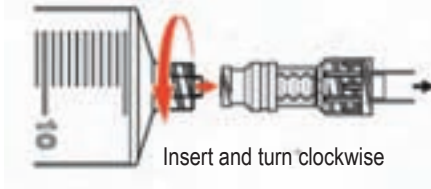
- 3) Place the tip of the tube for the left subclavian vein to the hole on the pit wall.
- 4) Attach the shoulder and jaw parts to the upper torso manikin and fix them by magnet fasteners.



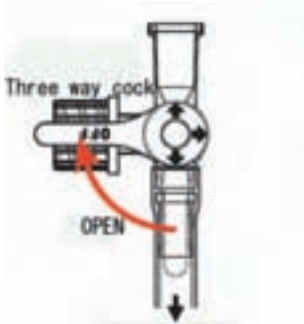
Landmark pad: Discharge of the simulated blood C1-C2

C1. Discharge the fluid from the artery tube

1) Place the upper torso upright.



2) Attach the syringe to the joint from the shoulder side of the torso.



3) Withdraw the fluid slowly by pulling the cylinder of the syringe.

4) Disconnect the syringe and discharge the fluid.

C2. With draw the fluid from artery tube

1) Place the upper torso upright.

2) Attach the syringe to the joint from the shoulder side of the torso.

3) Withdraw the fluid slowly by pulling the cylinder of the syringe.

Make sure to withdraw all fluid by tilting or changing the position of the torso.

4) Disconnect the syringe and discharge the fluid.

Transparent cannulation block: D1-D2



D. Setting up the transparent cannulation pad

The transparent cannulation block is an effective educational model to facilitate understanding of the relevant anatomical structure, and is applicable to trainings in cannulation by interchanging with the puncture pads.

Training items

- A) To learn the required depth and angle of the needle for each approach.
- B) To acquire the handling of catheter at the time of insertion, avoiding mislodging.
- C) To learn the advantage, disadvantage and possible complications of each approach visually, associating with anatomical understanding.
- D) To learn the order of the procedures.



D1. Setting up the cannulation block.

- 1) Place the transparent cannulation block to the cavity.
- 2) Attach the jaw and shoulder part.

Now you can practice cannulation by observing the catheter through the transparent block.



D2. Cover the cannulation block with a skin sheet.

Put the skin sheet over the pad noting the direction so that the slits of the skin sheet fit with the openings on the pad

Now, the cannulation training can be performed.

When insertion is not successful, trainees can remove the skin sheet to find out what has gone wrong.

PLEASE NOTE:

Do not make any puncture at any site besides the prepared openings.

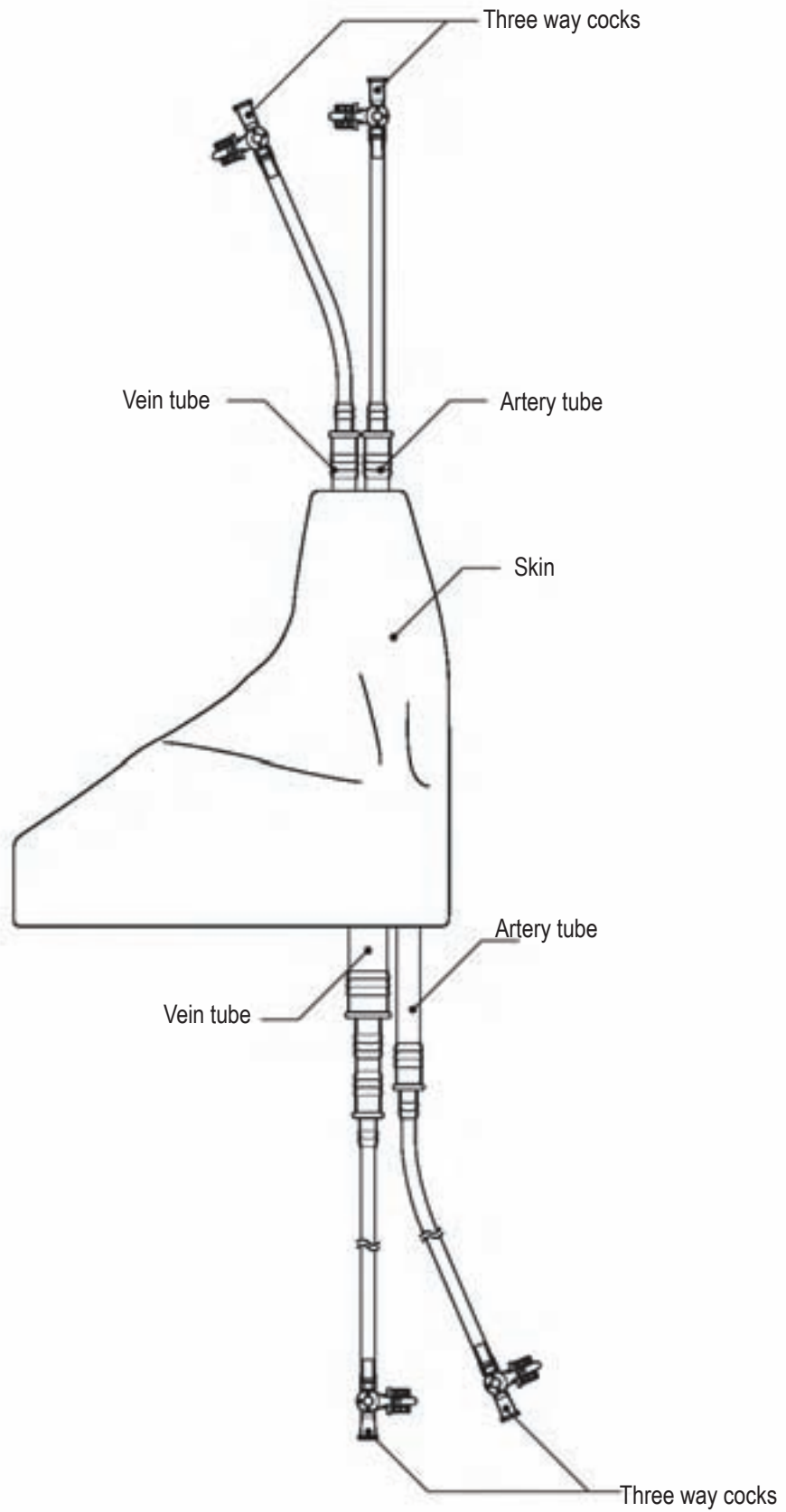
The transparent block is not designed to be filled with fluid. Do not pour any fluid or water to the openings on the cannulation block.

Please handle the skin sheet with utmost care. Excessive strain may cause breakage.

Remove all catheters and needles before you take out the skin sheet.

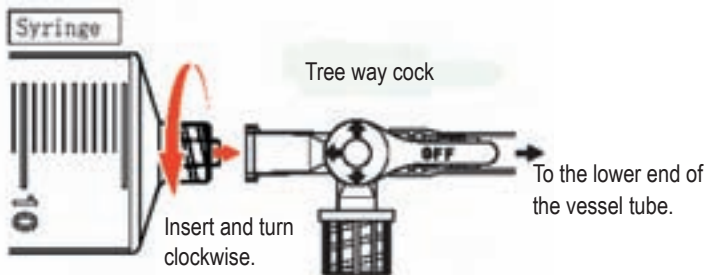


Ultrasound pad: Before training E1-E4



Ultrasound pad: Before Training E1-E4

E1. Place the pad in the cavity of the body torso.



E2. Fill the ARTERY tube with fluid

1) Connect the tip of the syringe with 20cc water to the three way cock at the lower end of the artery tube.

(Insert the tip and fix it by turning the syringe clockwise)

Please note:

First, start with the **ARTERY tube.**

Intended fluid amount for artery tube is **approx.20cc.**



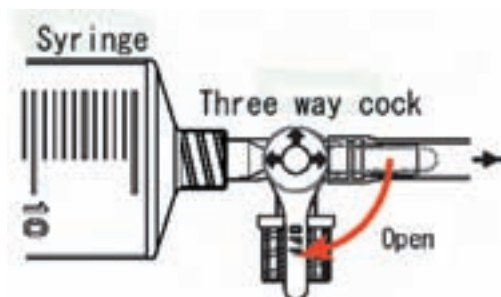
2) Put some water in the plastic bottle until approx. 5cm height.

3) Connect the tip of the tube from the bottle lid to the three way cock at the upper end of the artery tube.

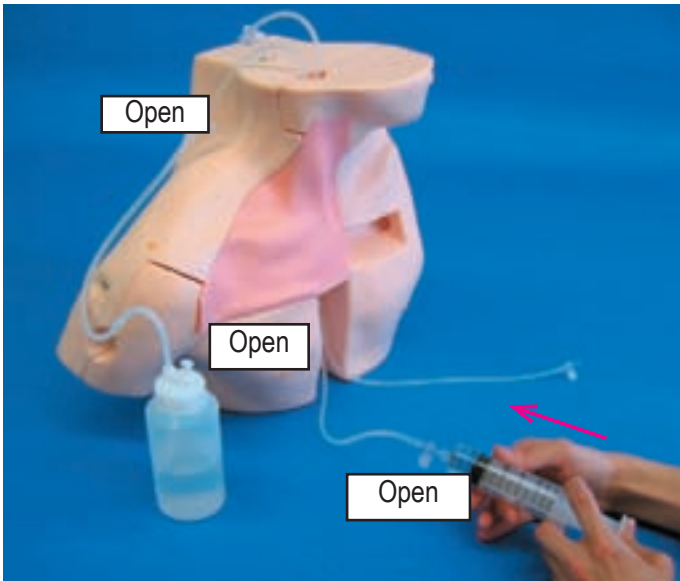
(Insert the tip of the tube to three way cock and fix it by turning clockwise)

Please note: Do not pull the tubes. The pulling force may cause damage to the puncture pad.

4) Open the three way cocks at both ends of the artery tube.



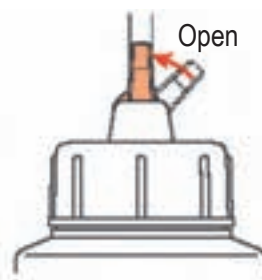
Ultrasound pad: Before Training E1-E4



5) Open the air hole on the lid of the bottle by setting the lever upright.

Inject the water in the syringe slowly into the artery tube.

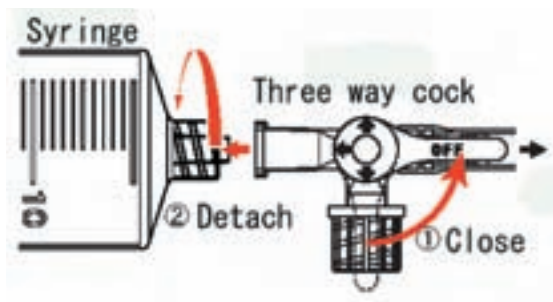
Please note : Make sure that **both three way cocks** and the **lever on the bottle lid** are **OPEN**.



Otherwise, excessive pressure may cause breakage in the vessel tubes.



6) Close the three way cock at the lower end of the tube and detach the syringe.



7) Close the three way cock at the upper end of the artery tube and detach the tube from the bottle.

E3. Fill the VEIN tube with fluid

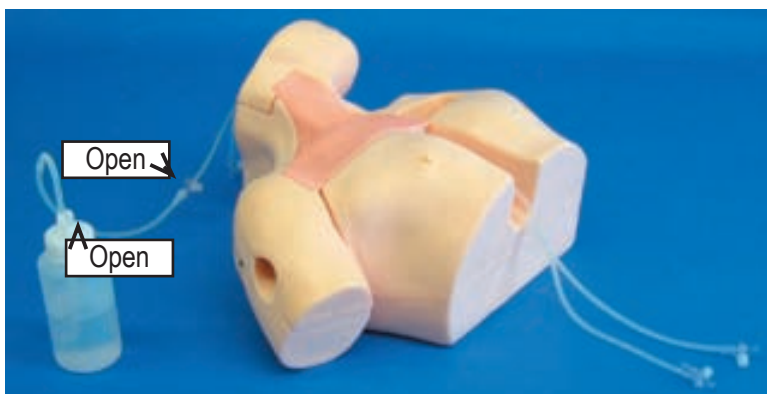
1) Fill the VEIN tube following the steps above C2.

Please note:

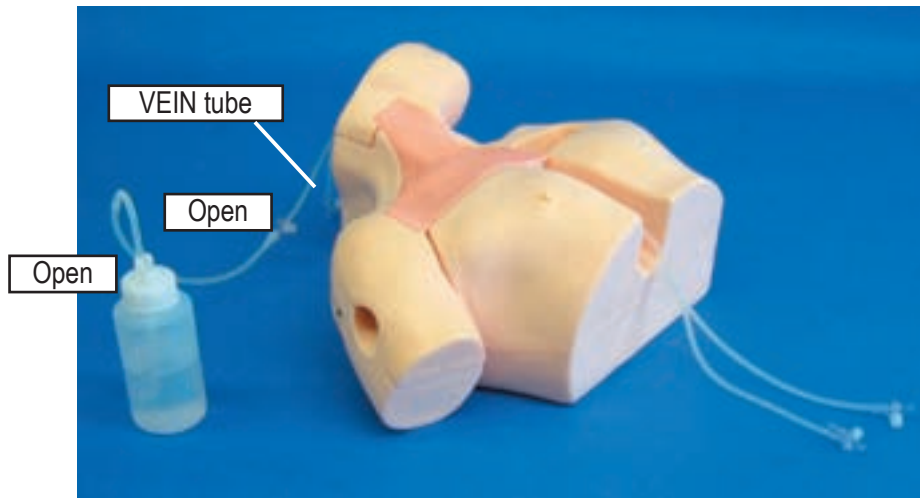
Intended fluid amount for the **VEIN** tube is **approx.30cc**.

E4. Ready

Start training **without detaching the bottle from the vein tube.**



While training with the Ultrasound Puncture pad: F



PLEASE NOTE: When the vessel tube is empty, ultrasound image will not be shown properly.

CAUTION: MAKE SURE TO OPEN THE COCKS BEFORE START FILLING OR REFILLING THE FLUID. OTHERWISE EXCESSIVE PRESSURE MAY CAUSE BREAK THE VESSEL TUBE.

Especially, **VEIN tube** embedded in the pad has a soft and thin wall.

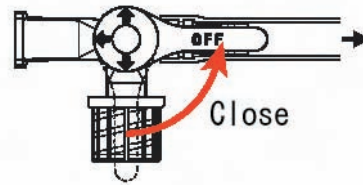
If fluid or air is injected while one of the cocks or air hole lever is closed, or when the tube is folded or clogged, **excessive pressure may cause a breakage or burst of the thin tube wall inside of the pad.**

Ultrasound Pad: After Training G1



G1. Discharge the fluid from the puncture pad.

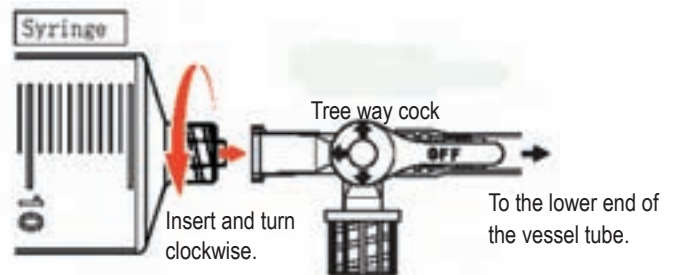
1) Connect the tip of the syringe to the end of the vessel tube.



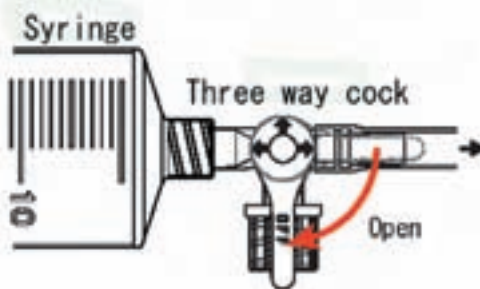
2) Detach the bottle tube from the upper end of the vein tube.



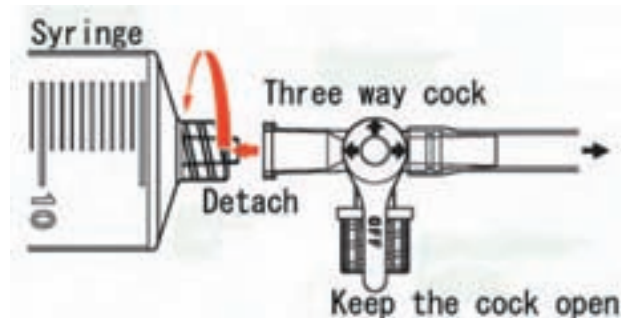
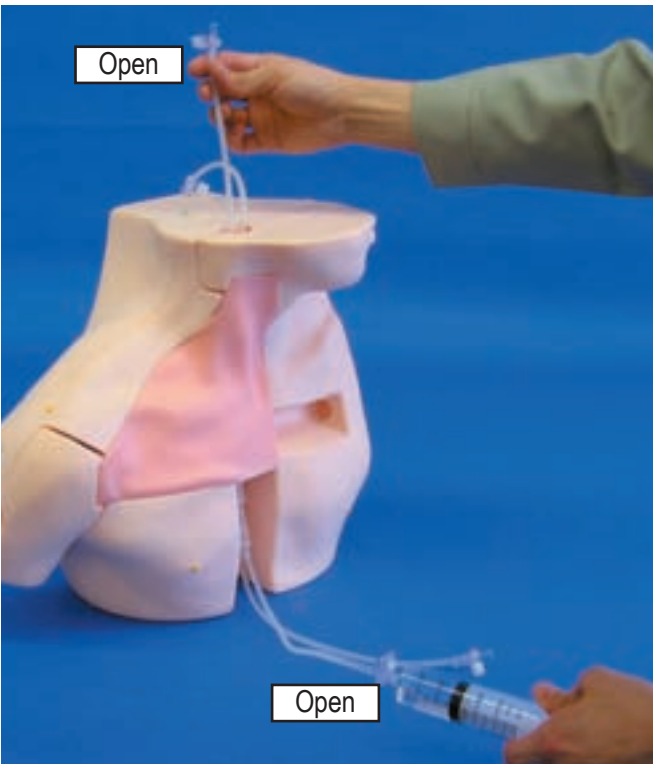
3) Attach the syringe to the lower end of the vein or artery tube.



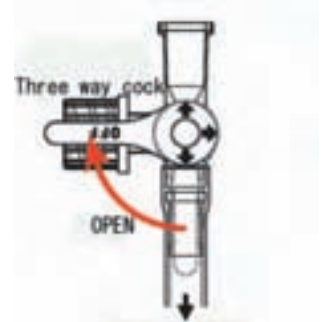
4) Open the three way cock at the tip of the syringe



Ultrasound Pad:After Training; G1 discharge fluid



5) Open the three way cock at the upper end of vein/ artery tube, which you intend discharge the water from, holding the tip upward to prevent the water from flowing out.



6) Withdraw the water by syringe, holding the upper end of the tube upward so that the water will not flow out.

Please note: Do not pull the tubes. The pulling force may cause damage to the puncture pad.

7) Detach the syringe from the tube and discharge the water in the syringe. Keep the both three way cock open for storage to dry the inside naturally.

Please note: Discharge all water after each session. Do not store the pad with any water left inside. Remaining water may cause deterioration in quality of the pad's performance.

Ultrasound pad: Replacement of Ultrasound pads H1



H1.Replacement of Ultrasound Puncture pad.

1) Take off shoulder and jaw parts from the upper torso manikin.

2) Lift the pad and take it off by holding the hard plastic walls.

Caution:

Do not pull the vessel tubes to move the pad.

Or it may cause tear or other breakage in the tube wall embedded in the pad. Especially vein tube has thin and soft wall.

3) Place a new pad to the cavity, noting its direction.

Please note:

Make sure that the tubes are not folded or tucked between walls of the pad and the body torso.

The simulator doesn't work properly when the tubes are folded.

4) Attach the shoulder and jaw parts to the upper torso manikin and fix them by magnet fasteners.

Ultrasound pad: Cleaning and Maintenance of the skin H2-3



H2. Cleaning

To remove the ultrasound gel on the skin, wipe the skin surface gently by soft cloth, or soft wet close.

When sticky feeling persist, wipe it by soft cloth with small amount of alcohol for disinfection.

Caution:

Never use paint thinner or organic solvent for cleaning.

It may cause breakage in the simulator skin.

H3. Maintenance of the skin

The skin of the ultrasound pad is not fixed and may come off if you hold the pad by skin only.

In such case, reattach the skin noting not to leave air bubbles in between. Air bubble or layer between skin and soft tissue will impair the quality of scanning image.

Please note:

Do not touch the surface of the soft tissue part, or expose the surface to air long time. Dust attached to the surface may weaken its adhesion and lead to deterioration in scanning images.

Troubleshooting

Quick check-up before calling the customer service

Use the table if you have problems using the system. Look in this section for a description of the problem to find a possible solution.

Trouble	Possible Reason	What to Do
Trouble in filling or discharging water/ simulated blood by syringe	The body torso with the pad is laid down. (Landmark pad)	Put the upper torso manikin upright.
	The puncture pad is worn out.	Order new pads for replacement.
	One or some vessel tubes from the pad are folded.	Straighten the tubes. (Do not pull them)
Leakage from puncture area	The puncture pad is worn out.	Order new pads for replacement..
	One or some vessel tubes from the pad are folded. There is pressure from outside.	Straighten the tubes. Withdraw all fluid from the tubes and squeeze the remaining fluid from the soft tissue. Dry the pad naturally.
Calotid pulsation does not work. (Landmark pad) <i>Please note:</i> Ultrasound pad is not designed to pulsate.	The pulsation unit (air bulb and tube) is not connected to the pad.	Connect the pulsation unit to the connector at the bottom of the landmark pad.
	The tube of the pulsation unit is folded in the pit.	Make the tube straight.
Ultrasound image is not clear.(Ultrasound pad).	The vessel tubes are not filled by water/fluid.	Fill the vessels by water.
	Air layer is formed under the skin sheet,	Reattach the skin sheet removing air bubbled and layers.
	The puncture pad is worn out.	Order new pads for replacement..

DOs and DON'Ts

DOs

- !! Use the supplied CVC or **thinner needles** for the trainings.
- ! Durable transparent cannulation pad is highly recommend for insertion training, in order to maintain the puncture pad **longer**, although it is possible to demonstrate the full procedure with puncturing pad.
- ! Make sure to open the three way cock (both ends for ultrasound pad) when you fill/discharge the fluid.
- ! Water proof spray (Scotch guard, etc.) can be effective to prevent the body from Being stained by colored water.
- ! Handle with care
The materials for the models are a special composition of soft resin. Please handle them with the utmost care at all times.
- ! Clean the surface of the pad with dry or wet soft cloth and put talcum powder before storage. Clean the upper torso manikin by dry cloth.
- ! Store the training set at room temperature, away from heat, moisture and direct sunlight.

DON'Ts

- !! Do not peel of the skin from the landmark pad.
- !Do not push the tube tip at the bottom of the landmark puncture pad.
- !Never wipe the simulator by paint thinner or other organic solvent.
- !Don't mark on the simulator and models with pen or leave any printed materials in contacted with their surface.
Ink marks on the models will not be removable.
- ! Do not store the simulator and pads with any water left inside.
- ! Do not use broken or bent needles for training.
- ! Never use the supplied CVC for purposes other than training with M93-U.



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