3B Scientific

Epidural and Spinal Injection Trainer

P61 (1017891)

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Epidural and Spinal Injection Trainer P61 (1017891)

Contents

Introduction

Congratulations on buying this high-quality simulator. Please read the operating instructions carefully before setting up the device. This will ensure that it works correctly, and that you can always work satisfactorily with this product. The epidural and spinal injection trainer is suitable for both medical training and for specialist medical training.

The epidural and spinal injection trainer is very impressive thanks to its extremely realistic haptic and acoustic feedback, and the use of high-quality, hard-wearing materials. The light, compact structure can be used in a wide variety of ways. The device has low operating costs and is intuitive to use, ensuring lasting, high-level performance.

A summary of the device's main functions:

- epidural anaesthesia using the loss-of-resistance and the hanging-drop technique
- spinal anaesthesia with realistic resistance of the dura and arachnoid mater with or without a cannula fluid-filled spinal canal with realistic outflow rate thanks to the ability to adjust the excess pressure
- an epidural catheter can be inserted into the epidural space
- closed water system
- easy to clean

Developed and manufactured in Germany!

Delivery contents:

The epidural and spinal injection trainer (P61) includes:

1 x base body
1 x vertebral bar
1 x LOR insert (loss-of-resistance)
1 x skin
1 x spinal canal with connector
1 x water collection container
1 x 10 cm tube
2 x 100 ml injections with cap
1 x spacer ring for injection
1 x extension tube for the hanging-drop technique

Quick Introduction

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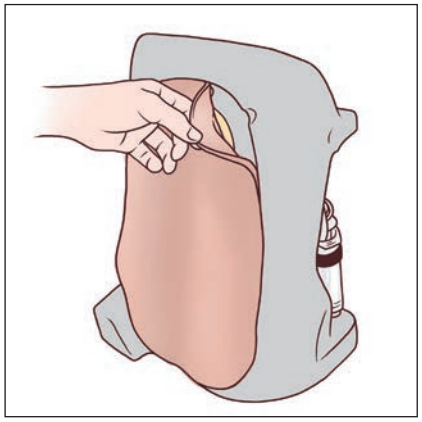

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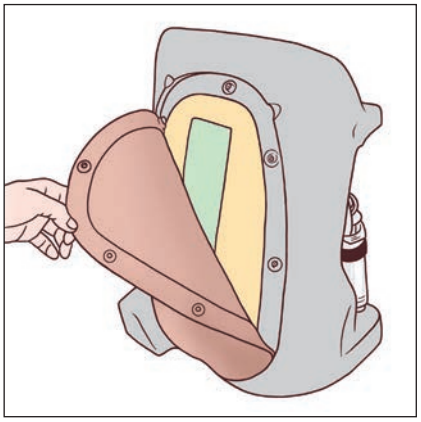

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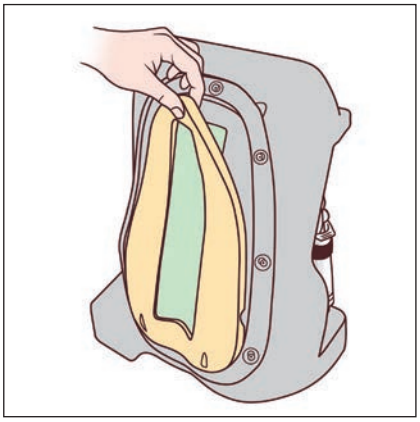

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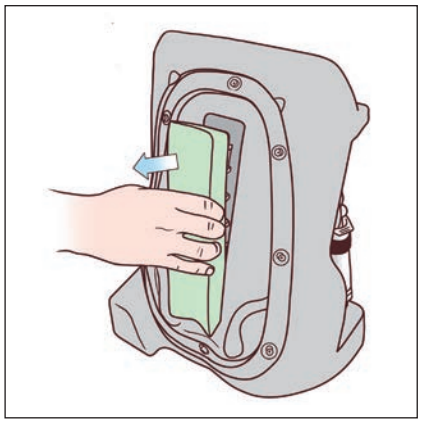

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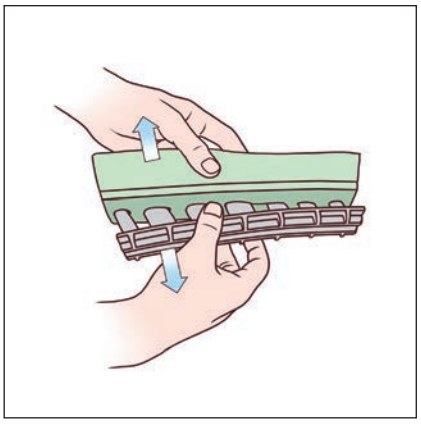

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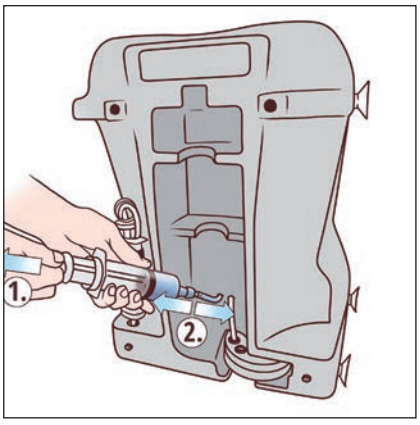

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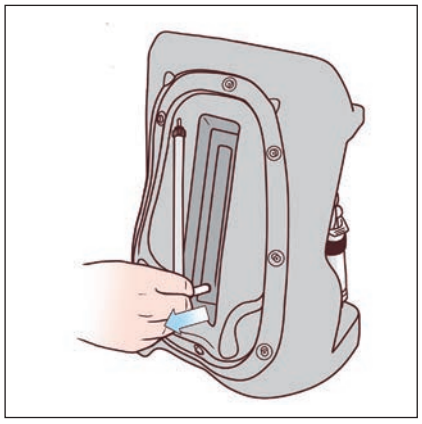

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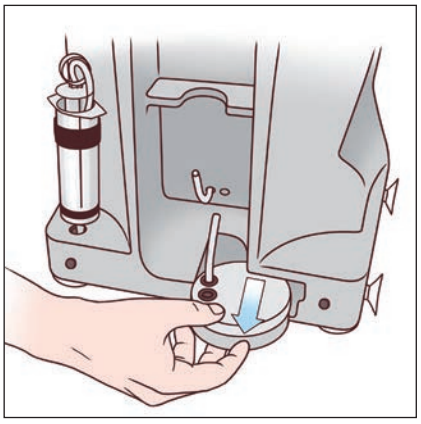

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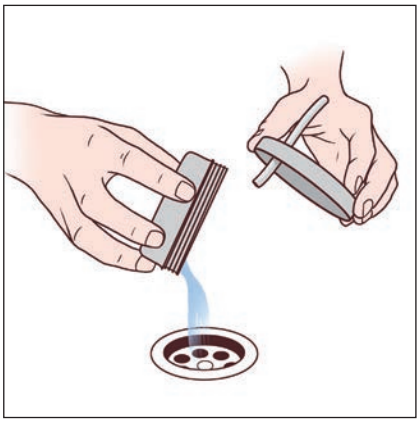

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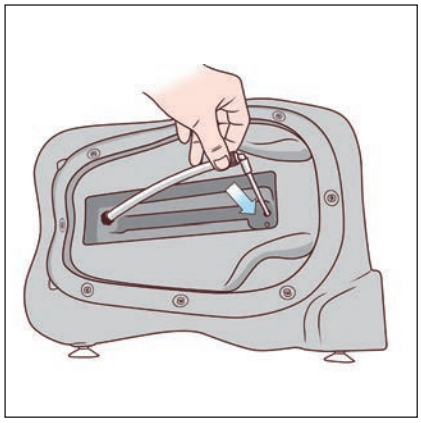

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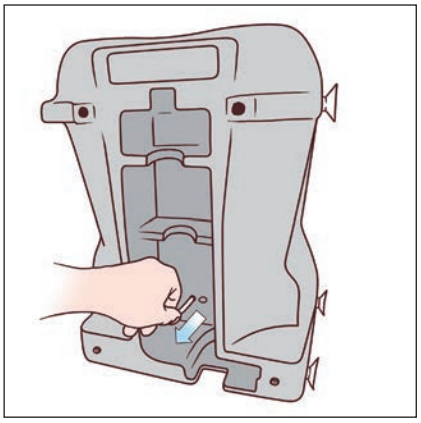

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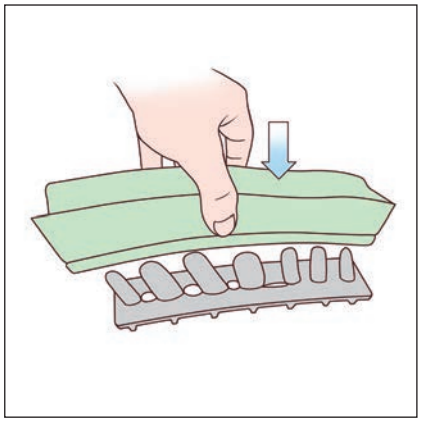

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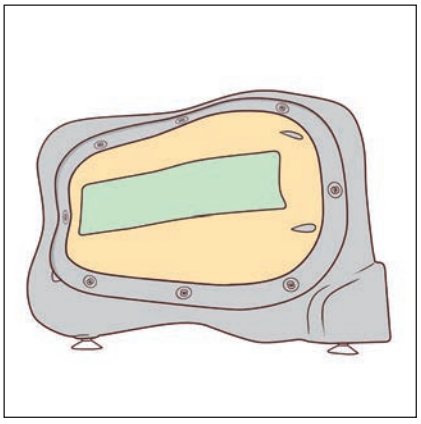

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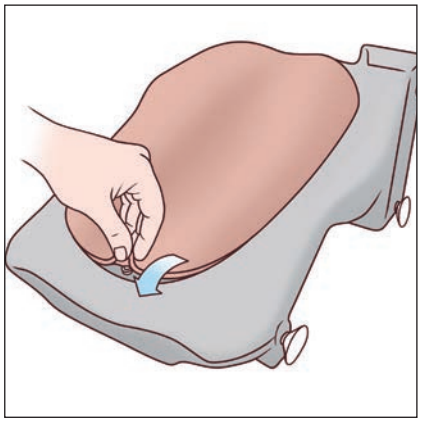

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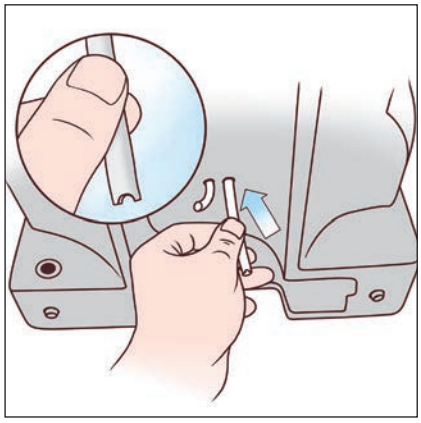

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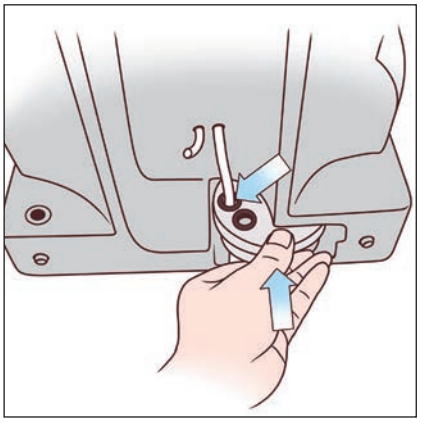

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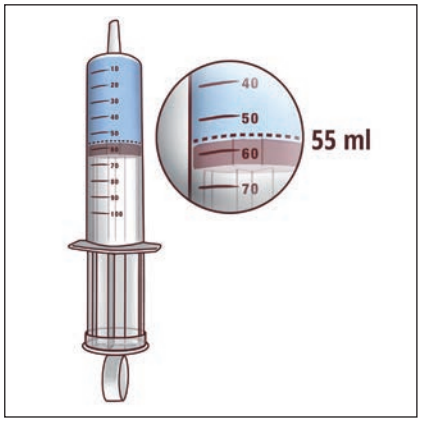

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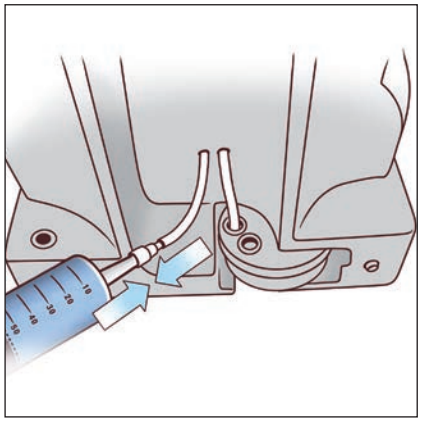

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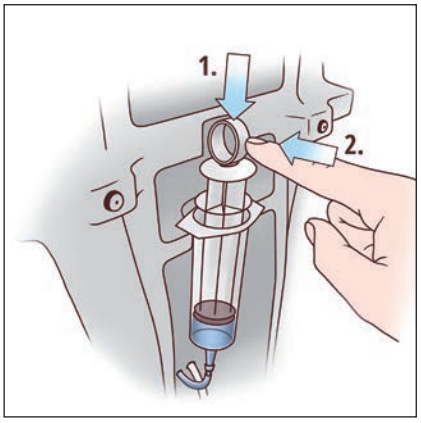

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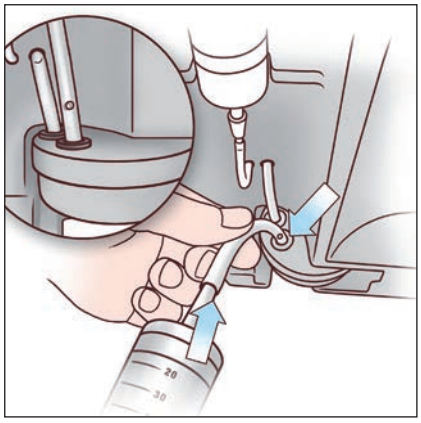


Assembly

Tip: The simulator is delivered fully assembled.

- place the base body on its back
- insert the spinal canal and pull the inserted tube sharply once from the back
- push the LOR insert on to the vertebral bar, and then squeeze together into the base body
- put in the foam insert
- attach the skin
- click the water collection container into place with the openings in the middle
- place the 10 cm tube into the socket and the base body

Start-up and use

Set-up for the epidural and spinal procedure

- fit an injection with a spacer ring
- fill up with 55 ml of water from the stop position. The pressure in the spinal canal can be changed by choosing different water volumes. Choosing higher amount will lead to a higher pressure.
- connect the injection to the spinal canal from behind
- press the injection plunger until resistance is felt (the spinal canal is full)
- clip the injection in place in the base body
- ready for use

Set-up for the hanging-drop procedure

- set up the simulator for the epidural and spinal procedure
- insert the extension tube with the hole at the end into the second opening of the water collection container
- place the injection without the cap on to the tube
- ready for use

Medical procedures

General instructions

This instruction manual explains how doctors and students can learn how to carry out a spinal or epidural anaesthetic on the phantom with professional instruction; and then practise doing the procedure. Using a similar technique, a lumbar puncture can also be carried out.

These instructions do not in any way replace a clinical textbook on regional anaesthesia or clinical training by an experienced anaesthetist on a patient.

The phantom should, however, help students to learn the moves and the procedure used to carry out regional epidural anaesthesia with very realistic, anatomical and haptic features.

This manual does not deal with indications, physiology/pathophysiology or the risks and side-effects of epidural anaesthetic. For this, please refer to the relevant textbooks.

The same applies for the administration and pharmacology of local anaesthetics for patients. Medical effects cannot be simulated on the phantom.

No side effects or drug administration errors, such as intravasal injection, can be simulated.

When carrying out epidural anaesthesia, the medical establishment‘s internal standards should be adhered to. In addition, hygiene guidelines, circulatory monitoring and any medication used should be stated.

When learning about and practising epidural anaesthesia on the phantom, the medical establishment‘s internal standards should be followed. Apart from monitoring circulation and the pharmacological effect of local anaesthesia, all steps of regional anaesthesia can be carried out realistically.

Use of the material

All usual materials can be used to carry out epidural anaesthesia.

The silicone skin can be treated with the usual disinfectant agents.

All usual plasters and wound dressings can be stuck to the silicone skin. They can usually be removed without leaving any residue. Film dressings adhere with very little support to the silicone.

Training on the phantom

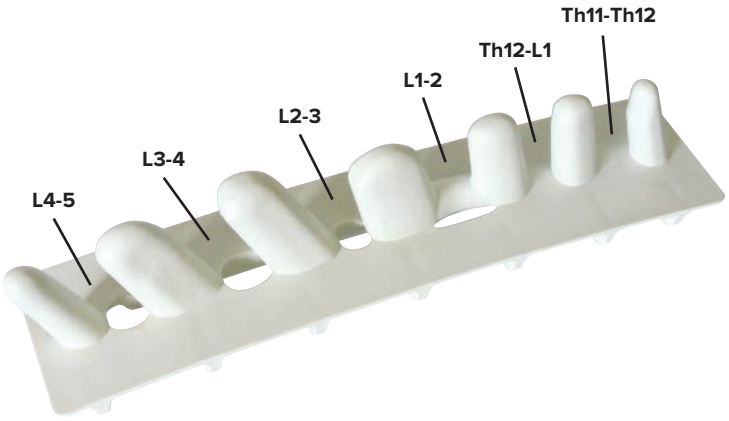
When training on the phantom, it is recommended to adhere to internal standards, and to choose a method similar to the one used on patients, and to select the usual set of instruments. No special needles are required. All usual spinal and epidural needles can be used.

It is recommended that hygiene standards are respected and that procedures are carried out under sterile conditions when training on the phantom.

Training on the phantom

The phantom has been designed so that the same anatomical landmarks can be identified as those on a person. The entire lumbar spine is shown. Puncture attempts can be made from L1/2 to L4/L5.

Th11-Th12	Frustration threshold
Th12-L1	Frustration threshold
L1-L2	Laterally oval
L2-L3	Normal, small
L3-L4	Normal, large
L4-L5	Normal, medium



The spinous processes can be felt through the skin and the subcutaneous fatty tissue. The iliac crest (upper edge of the ala ossis ilium) can be felt laterally. The connecting line between the ala ossis ilium (intercristal line, Tuffier‘s line) divides the intervertebral space L3/L4.

From there, the other intervertebral spaces can be identified and named.

The puncture can be made both in the upright and recumbent positions.

Median or paramedian access can be chosen.

The silicone skin can be drawn on with a water-soluble marker to identify the anatomical landmarks. The markings can then be washed off with water.

Spinal anaesthesia

Procedure

First off all, the anatomical landmarks should be identified and the intervertebral space should be located where the puncture is to take place. This can be done in the upright or recumbent position.
The anatomical landmarks can be drawn on with a non-permanent marker. Then preparations are made for the spinal anaesthesia in accordance with the establishment‘s clinical guidelines.

The material to be used is laid out and a check is made to ensure that everything is present.

It is recommended that hygiene standards are respected and that procedures are carried out under sterile conditions when training on the phantom.

The lumbar puncture area is washed with a disinfecting agent according to the establishment‘s clinical guidelines, and covered with sterile drapes.

After checking the anatomical landmarks once more, the cannula can be inserted. The cannula will pierce the skin and the subcutaneous fatty tissue. The spinal needle is fed into the cannula. After passing through the subcutaneous fatty tissue, the needle is pushed through the interspinous ligament. It is normal to feel some resistance at this point. After around 5 cm, a typical elastic-type resistance is felt as the needle passes through the dura. The stylet of the spinal needle can be removed before or after piercing the dura. After piercing the dura, and removing the stylet, the spinal needle will fill up with fluid, and local anaesthetic can be injected in the normal way. The rate at which the spinal needle fills up with the simulated fluid, or the pressure with which it flows out, depends

on the pressure in the fluid chamber. This pressure can be adjusted with an air cushion and a syringe plunger. If the outflow rate of the fluid is too fast, the quantity of water in the syringe can be reduced from 55 ml to 50 ml.

The simulated fluid consists of normal water. The typical slow-flow phenomenon can be demonstrated with a hyperbaric local anaesthetic when carrying out barbotage (aspiration of fluid).

After removing the spinal needle, the puncture hole will close up and no more fluid will come out.
The simulated puncture site can be covered with the usual adhesive dressing.

Epidural anaesthetic

Procedure

First off all, the anatomical landmarks should be identified and the intervertebral space should be located where the puncture is to take place. This can be done in the upright or recumbent position.
The anatomical landmarks can be drawn on with a non-permanent marker. Then preparations are made for the epidural anaesthesia in accordance with the establishment‘s clinical guidelines.

The material to be used is laid out and a check is made to ensure that everything is present.

The puncture needles, catheter and the connector should be checked for compatibility and patency before carrying out the puncture.

It is recommended to adhere to usual hygiene guidelines when practising on the phantom and to work in sterile conditions.

The lumbar puncture area is washed with a disinfecting agent according to the establishment‘s clinical guidelines, and covered with sterile drapes.

After checking the anatomical landmarks once more, the puncture can be carried out.

Loss-of-resistance method

The epidural space is shown on the phantom by a cavity that is located right under the dural sac. In the dorsal direction, the limit of the space is formed by the tissue block, which simulates the ligaments and the tissue in the intervertebral space. It is around 40-45 mm deep.
The puncture can be made in the mid-line or from the paramedian side.

The gap between piercing the skin and epidural space is about 50 mm.

Usually, a Tuohy needle is used to carry out the puncture.

After once more identifying the spinal processes, the silicone skin is pierced with the Tuohy needle containing the stylet. The needle should be inserted with the bevel in a perpendicular position (lateral opening), so that, should the dura be accidently perforated, the perforation site will be kept as small as possible.

When pushing the needle through the interspinous ligament, it is usual to feel resistance. After removing the stylet, a smooth, liquid-filled syringe is placed on the taper of the Tuohy needle. The needle is pushed through, with light but constant pressure on the syringe plunger. When the epidural space is reached, the usual loss of resistance is felt as the liquid is injected. The Tuohy needle is rotated by 90° with the opening facing upwards and once more liquid is injected to check the position in the epidural space. After removing the syringe, the catheter can be pushed through the needle into the epidural space without any resistance. If the catheter cannot be inserted, the needle can be pushed forward another 1-2 mm and another attempt can be made to push the catheter through.

If the puncture is made too close to the lower edge of the upper spinal process, it may be difficult to insert the catheter.

If the catheter cannot be pushed through the epidural needle, the catheter should never be withdrawn through the needle in place, because it could accidently snap off. The needle and the catheter must be pulled out together if this happens.

After pushing the catheter in to the desired depth, the needle and the catheter in place can be pulled out, and the catheter can be fixed in position with a plaster, in accordance with the establishment‘s guidelines.

The tunnelling technique cannot be demonstrated on the phantom.

The hanging-drop technique

The hanging-drop technique can also be simulated on the phantom. Thanks to the phantom‘s design, low pressure can be created in the epidural space (see Set-up for the hanging-drop procedure, page 6).

The Tuohy needle is pushed through the skin, subcutis and interspinous ligament, as described above. The stylet is, however, removed just before the epidural space is reached. Now, the most transparent needle hub is filled with liquid so that a hanging-drop forms on the opening. The needle is pushed in further. After reaching the epidural space, the drop is sucked in by the second 100 ml syringe thanks to the manually-created low pressure. The catheter is inserted as described above.

FAQ

When carrying out the loss-of-resistance technique, the pressure in the injection drops too soon.

The LOR insert has exceeded its maximum number of insertions and a replacement must be acquired (1017893).

There is no resistance or noise when the needle is inserted.

The LOR insert has exceeded its maximum number of insertions and a replacement must be acquired (1017893).

The skin has clear signs of wear or is disintegrating where the needle is frequently inserted.

The skin has exceeded its maximum number of insertions and a replacement must be acquired (1017892).

The suction cups do not adhere properly.

The suctions cups must be slightly moistened in this case to produce the highest level of adhesion. Otherwise, they should be placed on a flat surface.

When carrying out the spinal anaesthesia, no fluid comes out of the needle when the spinal chamber is reached.

The pressure through the clamped syringe has been reduced by too many simulations. The syringe should be refilled, as described in „Start-up and use“ and then connected. If this does not produce the desired result, the spinal tube has been pierced too often and has reached its maximum number of insertions. A replacement must be acquired (1017893).

Water is flowing out of the water collection container.

The water collection container must be emptied and put back on.

The skin does not fit snugly on the base body.

In this case, the press studs should be checked to make sure that they have actually been clicked into place.

When carrying out the hanging-drop simulation, the drop is not sucked in when the correct insertion depth is reached.

Please make sure that everything has been correctly put in and the LOR insert has been properly pressed into the base body.

May I spray coloured disinfectant agent on to the skin?

Yes, the disinfectant agent can be easily washed off with water.

Can gauze plasters be used to stick the catheter to the simulator?

Yes, any adhesive residue can be washed off the skin.

Maintenance and care

After using the epidural and spinal injection trainer, all removable parts should be taken off. The water collection container should be emptied. Then all components that came into contact with water should be dried with a towel. When the simulator is dry, it can be assembled and tidied away.

Replacement parts list

Order number	Replacement part
1017892	Replacement skin
1017893	Replacement LOR insert (2 LOR inserts with 2 spinal tubes)

Technical data

Dimensions: Simulator (H x W x D) 45 x 35 x 24 cm
Weight: Approx. 3 kg

Operating conditions:
Operating temperature: -10°C to +40°C
Storage temperature: -20°C to +60°C

The plastics used meet the requirements of the DIN EN 71-3/9 Toy Safety Directive

P61 (1017891) 08/2014

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