Instructions for Use

Peritoneal Procedures Training Model

Computerized Version

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Instructions Version 4.0
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# Table of Contents

<table>
<thead>
<tr>
<th>Page</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Overview</td>
</tr>
<tr>
<td>4</td>
<td>Model Overall View and Components</td>
</tr>
<tr>
<td>5</td>
<td>Assembly of Model</td>
</tr>
<tr>
<td>8</td>
<td>Peritoneoscopic Catheter Placement with Ultrasound Evaluation</td>
</tr>
<tr>
<td>13</td>
<td>Placement of PD Catheter by Seldinger Technique with Fluoroscopy</td>
</tr>
<tr>
<td>15</td>
<td>Renal Biopsy under Ultrasound or Fluoroscopy</td>
</tr>
<tr>
<td>17</td>
<td>Webcam Software Operation</td>
</tr>
<tr>
<td>19</td>
<td>Cleaning and Storage</td>
</tr>
<tr>
<td>20</td>
<td>Appendix 1: Webcam Software Installation</td>
</tr>
<tr>
<td>21</td>
<td>Appendix 2: Setting Up a Dedicated Laptop</td>
</tr>
<tr>
<td>21</td>
<td>Appendix 3: HemoCleanse Contacts</td>
</tr>
<tr>
<td>21</td>
<td>Appendix 4: Trademarks</td>
</tr>
<tr>
<td>22</td>
<td>Parts List for Peritoneal Procedures Model</td>
</tr>
</tbody>
</table>
Overview

The PD Catheter / Kidney Biopsy Model is designed to give physicians experience with the mechanical steps of placing chronic tunneled peritoneal dialysis catheters by peritoneoscopy, fluoroscopy, or blind techniques. The model provides a simulation of the physical characteristics of the abdominal wall including the anterior and posterior rectus sheath, subcutaneous tissue and skin. The “two-pop” feel as a needle or trocar passes through the rectus muscle is replicated well by the model. The model allows ultrasound imaging of the abdominal wall and abdomen and provides a video camera image from below to simulate a fluoroscopic picture of a patient’s abdomen. A second video camera and adaptor is provided to attach to a peritoneoscope to give a video-laparoscopic view of the inside of the abdomen. Practice with the model does not provide sufficient experience to perform procedures on patients but it does give familiarity with the steps and equipment needed.

The model includes simulated bowel loops and a single kidney attached to a rod which creates motion of the organs as would be seen with respiration in the patient. The model may be used for practice in kidney biopsy using real time ultrasound or simulated fluoroscopy.
Model Overall View and Components

The appearance viewed from the anterior abdominal surface is as at left. The abdominal wall contains a skin surface, subcutaneous tissue, external rectus sheath, rectus, and internal rectus sheath. The side skin is for passage of a kidney biopsy needle or as a window for ultrasound visualization of the kidney. The rubber bulb is for simulating blood flow through an epigastric artery.

At left the abdominal wall is removed from the model, revealing a sliding rod that can provide “paradoxical” motion as occurs with respiration for the simulated kidney and loops of bowel. The kidney and bowels are each detachable from the rod. Removal of the kidney is advised when the model is used for placement of PD catheters.

The model at left is assembled. The model can be turned on its side to check the progress of PD catheter placement (though it is easier to use the WebCam Box for this as described below). The model is placed on its side also for kidney biopsy under ultrasound with the biopsy needle passed through the side skin.
Assembly of Model

Open the WebCam Box, and screw the WebCam holder to the lower border of the box. Attach cable from WebCam to the portable computer provided.

Attach a second WebCam to the Y-Tec™ scope if the model is to be used for peritoneoscopic PD catheter placement. Attach cable from WebCam to the portable computer provided. Turn on the portable computer and the WebCam software will recognize the video devices.

Attach power supply to computer
Plug USB connectors from webcams into USB ports on back of computer

Attach abdominal wall to the model using the spring clips.
Set model on side and fill model through port with 4 liters of water. The level will rise to the upper clamp.

Add 3 mL citrate neutralization solution to the contents of the model.

Press on anterior abdominal wall of model to bring the air-fluid level up to the entry of the port. Screw in port cap.

Fill Reservoir with water to about 1/3 of full volume. Attach tubing end that has no internal valve to the Reservoir.

Thread tubing through the Reservoir Ring and plug into the model.
Place model on top of WebCam box. Fit feet of the model into depressions on top of the box

Create an incision through the skin and SQ tissue using a scalpel and hemostat, to the level of the external rectus sheath. Pour a small amount of water into this opening to facilitate ultrasound imaging.
Peritoneoscopic Catheter Placement with Ultrasound Evaluation

Place ultrasound gel on the probe and hold probe on the abdominal wall.

Move the bowel layer back and forth and observe the ultrasound image.

Bowel surfaces and visceral omentum moving next to the parietal peritoneum indicates that there are no significant adhesions in the peritoneum at this point. Note that ultrasound also can determine a position near the lateral or medial border of the rectus muscle through which to place the catheter, assuring that there is sufficient muscle tissue to receive the cuff. It also measures the depth of subcutaneous fat.

Open the skin and SQ tissue incision with Weitlaner retractors (provided with model).
Insert trocar, cannula and Quill guide through the abdominal wall. When two distinct “pops” are felt, stop advancing the trocar. NOTE: an alternative approach is to create a pneumoperitoneum using a Veress needle, and then insert the Y-Tec cannula.

Insert scope and camera into the cannula, attach light source and turn on at low intensity.

The view depicts contact vision of the scope with the viscera, which is indistinct. In the patient each inspiration moves bowel loops or omentum across the tip of the scope, from cranial to caudal direction. In the model, moving the bowels up and down creates a similar movement. This “paradoxical” movement confirms intraperitoneal location of the scope and cannula.

Infuse air through the cannula into the peritoneum using a sphygmomanometer bulb or syringe/valve/filter. Disconnect the Reservoir from the model at this time to avoid transferring too much fluid into the Reservoir.
Reinsert the Y-Tec Scope and rotate the cannula to the horizontal position. The view now should be across the top of the bowel loops, looking towards the opposite end of the peritoneum through the air space. If this view is not seen, retract the scope to place the tip of the scope in the airspace and rotate the scope to the horizontal position.

While maintaining the view across the bowel loops, advance the scope into the abdomen into the most distant part of the lower abdomen.

Remove the scope, un-tape the cannula from the Quill guide, clamp the tab of the Quill guide and remove the cannula.

Place a few drops of pure glycerol (provided) into the Quill guide, as lubricant. Then dilate the Quill guide with 4 and 6 mm diameter dilators.
Advance the catheter with internal stylet through the Quill guide, retracting the stylet intermittently. Observe progress of catheter placement on the WebCam image, if desired.

When the cuff reaches the external rectus sheath, place the Cuff Implantor behind the cuff, hold the Quill firmly, and advance the cuff into the musculature.

The tab of the Cuff Implantor stops forward motion of the cuff when it enters the rectus muscle, avoiding advancement of the cuff through the muscle layer.

Hold the catheter, Cuff Implantor and internal stylet firmly, and remove the Quill Guide from around the catheter. Remove the stylet and finally the Cuff Implantor.
The cuff is firmly implanted in the rectus sheath, as demonstrated by giving a gentle pull on the catheter. Placing a finger next to the external rectus sheath confirms that the cuff is just below the sheath.

To create the subcutaneous tunnel, first determine an exit site 2-3 cm distal to the superficial cuff. Make a single stab incision through the skin, in direction of the catheter.

Pass the Tunnelor Tool through the exit site, above the subcutaneous tissue and through the primary incision (in patients the course will be through the middle of the SQ fat layer). Attach the catheter and draw it through the SQ tract to and through the exit site (in patients, the tract may be easily dilated by attaching a hemostat to the catheter, drawing the hemostat into the tunnel and expanding the hemostat to create a passageway for the cuff).

Final position of catheter: The primary incision can be closed and sutured if desired.
Placement of PD Catheter by Seldinger Technique with Fluoroscopy

For the blind entry of the peritoneum it is best to use an 18 gauge needle with a blunt obturator, as shown here by the Seldinger needle. This gives the best tactile feeling as the needle passes through the external and internal rectus sheath.

The Seldinger needle is advanced through the rectus sheath towards the peritoneum, feeling two distinct pops as the tip passes through the anterior and posterior rectus sheaths.

The obturator is removed and a syringe is attached with a pH sensitive dye (provided). The dye is injected quickly.

As viewed through the WebCam, the dye creates a “peritoneogram” picture, simulating the fluoroscopic picture after dye injection. If the red color remains in the model, injecting a few ml of citric acid (provided) will remove the color.
After the intraperitoneal position of the needle is confirmed, a long Teflon-coated guidewire is inserted through the needle.

Progress of the wire insertion may be viewed through the Webcam from below, simulating the fluoroscopic picture. Advance the wire until it makes a large curve within the peritoneum.

With the wire in place, dilate the tract, advance the split-sheath and dilator into the peritoneum, and remove the dilator and guidewire (steps not shown here). Advance the PD catheter through the split-sheath, splitting the sheath as the cuff advances. When cuff reaches the external rectus sheath, use small hemostats to press it into the muscle layer, and then remove the rest of the sheath.
Renal Biopsy under Ultrasound or Fluoroscopy

On assembly of the model, attach the kidney to the movable rod in the lower part of the model. You may leave the bowel layer in place or remove it. Finish assembly and filling of the model as above.

There are two approaches for ultrasound of the PD model. One is through the muscle wall (called anterior abdominal wall above) which gives a cross-section or longitudinal image of the kidney, and also demonstrates the bowel loops. Moving the rod creates motion of the kidney and bowels as seen during respiration. The ultrasounds at left demonstrate the full extent of motion of the kidney (moving to left and right beneath a stationary ultrasound probe).

One approach to biopsy of the kidney is through the side skin while performing ultrasound through the muscle wall. The kidney may be viewed in cross section or in longitudinal section. Needle is being inserted into the kidney from the right in this ultrasound. Note that biopsy needles may or may not remove pieces of the silicone rubber kidney.

Another approach to biopsy of the kidney is to perform the ultrasound through the side skin and advance the needle through the muscle wall. Bowels should be removed when planning this approach.
For practice in kidney biopsy using fluoroscopy, view the kidney from the WebCam box as demonstrated above. The biopsy needle may be advanced through the muscle wall approach (simulating a posterior approach) or the side skin approach.
Webcam Software Operation

Note 1: To avoid hassles with Microsoft updates, wireless access is DISABLED. Do not try to connect to the Internet. There is no password.

Note 2: This computer and software is capable of controlling two cameras. Both cameras are used with the Peritoneal Procedures Model.

Plug both of the camera to the USB ports on the back of the laptop.

Turn the computer on with the power button. You do not need to log in.

The camera software will appear. You may get a message about changing the number of webcams. Just click OK. If the software does NOT appear, use the lowermost leftmost icon on the desktop.

There is also a bit of an issue with Windows. It remembers camera serial numbers. Even though the cameras are completely interchangeable, you may get a message from Windows about installing cameras or drivers. ALWAYS choose “Finish installing ...” or similar. Sometimes, the “installation” will cause the camera software (Easy Web Cam) to fail to recognize a camera. Simply shut down and the turn the computer back on without changing the camera connections at the USB ports.

You will see two pieces of software:
1. The camera view
2. The camera controller

Note the buttons on the camera view, Cam 1 and Cam 2. The pale orange button is the current camera. Click the orange button for the other camera. In the camera view, note the "Menu" in the lower left border of screen. Selecting the Menu allows you to change to full screen view. The Windows key will return you back to partial screen mode. Also, if you click on the picture, it will toggle it back and forth between small and large.
In the camera view, note the "Menu" in the lower left border of screen. Selecting the Menu allows you to change to full screen view. The Windows key will return you back to partial screen mode. Also, if you click on the picture, it will toggle it back and forth between small and large.

The camera controller allows you to manually zoom, pan (change direction of view), or focus. The center green button centers the view, while the arrows pan. Panning only works if you are zoomed. To zoom, use the slider on the right.

In certain cases, you may wish to manually focus. To do this, click >Webcam Options. UN-check "Auto-focus" and use the slider below to change the focus. For example, you can focus through the bottom of the Vascular Model box up to the top.

To shut down the computer, use the power button - the same one you used to turn it on. DO NOT use the Windows Start Menu to shut down because Vista defaults to hibernate which creates problems.
Cleaning and Storage

Cleaning procedure for Model

A. Empty the solution from Reservoir and the Model
B. Rinse Model and Reservoir with clean water and empty both. Allow to air dry; otherwise mold will grow in the model.

Computer shut down
To shut down the computer, use the power button - the same one you used to turn it on. DO NOT use the Windows Start Menu to shut down because Microsoft Vista defaults to hibernate which creates problems.
Appendix 1: Webcam Software Installation

1. Plug the memory stick into the computer.
2. You may have to wait for Windows to recognize the stick and gain access to it.
3. Use "Computer", "My Computer" or the pop-up dialog to look at the files on the stick.
4. Double click on lws210_full (lws210_full.exe).
5. Let it grind, then click "Next" when asked.
6. When asked to plug in the camera, plug the BOX webcam into the LEFT (as you face the laptop rear) USB port.
7. WAIT until the screen says "Webcam Connected. Logitech ...", then click "Next".
8. UN-check "Include Logitech Vid HD", then click "Next". (Leave "Quick Install" checked.)
9. After some grinding, you should see on the screen what the camera sees. Then click "Next".
10. Click "Check Out My Webcam."
11. Click "Quick Capture."
12. You should see what the camera sees.
13. Click "Controls".
14. Click "Webcam Options".
15. Click the "Advanced Settings" tab. Ensure that NSTC-60Hz is selected.
16. Click the "Webcam Control" tab.
17. Ensure "Follow My Face" is UN-checked.
18. Close this dialog box. IF asked to, SAVE your settings. After this, saving is optional.
19. Close the software.
20. Back to the memory stick, double click on EasyWebCam (EasyWebCam.exe).
21. In succession, click "Next" 3 times as asked in succession.
22. Click Finish.
23. If necessary, move the Easy Web Cam shortcut icon on the desktop to the lowermost, leftmost corner so it can be found rapidly.
24. Plug the computer into the Internet with a cable. Check that you are connected.
25. The computer may already have a license. If so, omit the next step.
26. Use the buy option to purchase a license. Use webmail to check your email to get the license email and save it to a text file on the computer's desktop and to the memory stick identifying which computer it is for.
27. Go to the memory stick or text file from the unlock email. Highlight and copy the key to the clipboard using Ctrl-C.
28. Go to Start / Programs / Easy Web Cam / Buy or UNLOCK Easy Web Cam.
29. Click once on the box and use ctrl-V to paste the unlock code into the box.
30. Click the button. It should acknowledge your code.
31. Using the lower left icon, launch Easy Web Cam.
32. (See also below for another message) You may get a message asking about the router, uPNP, etc. It will ask if you want to be taken to a web site. Answer NO.
33. You may get a message asking if you want the webcam controller to automatically launch. Answer YES.
34. In Easy Web Cam, if you have a big screen, click on it to make it smaller so you can see the control tabs. Then click on the "Times" tab. UN-check all days.
35. In the "More" tab, UN-check sound effects.
36. In the "Set Video Size", select 800 x 600 for the output size and 30 Frames Per second.
37. You are done. Test the installation as per the operating instructions above.
Appendix 2: Setting Up a Dedicated Laptop

DO NOT do this for a personal or general laptop. These settings are NOT necessary in order to use a general purpose laptop for the WebCam Box system.

Perform the following actions:
1. Set video resolution to 1024 x 768 for 4:3 screen or 1280 x 768 for 16:9 screen.
2. Go to Control Panel / Classic View / System / Device Manager. Find "Network Adapters" and look for wireless or 802.11g (Or similar) adapter. Right click and choose Disable. We don't want the computer on the Internet except via cable. That way updates, anti-virus, etc. are not needed and won't be in the way as the computer may be used only every few months.
3. In Power Options, make sure the Power button shuts down, as opposed to hibernate, etc. Also set to do nothing if the lid is closed.
4. Perform "Installation" steps above.
5. You may wish to copy the memory stick contents to the laptop.
6. You should print these instructions and provide a copy with each laptop.
7. Remove account password and set computer to automatically boot up and log into an account that has administrator privileges.
8. In Control panel or Display Options (Right click on display.), Set screen saver to one hour. Click the power button. Set turn off hard drive to never and screen off to one hour.
9. Go to Automatic Updates. Turn OFF automatic updates.
10. Go to Security Center. Turn OFF all warnings.

Appendix 3: HemoCleanse Contacts

Any questions regarding this model may be forwarded to:

Mr. David Carr
dcarr@hemocleanse.com
765-742-4813 ext. 217
or

Dr. Stephen Ash
sash@hemocleanse.com
765 427 7007

Appendix 4: Trademarks

Y-Tec Scope, Quill Guide, Dilator, Tunnelor Tool and Cuff Implantor are all trademarked by Merit Medical Systems, Inc.
# Parts List for Peritoneal Procedures Model

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model Components</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Peritoneal Dialysis Training Model</td>
</tr>
<tr>
<td>1</td>
<td>Water Reservoir</td>
</tr>
<tr>
<td>1</td>
<td>Water Reservoir Holder</td>
</tr>
<tr>
<td>1</td>
<td>Tube: Model-to-Reservoir</td>
</tr>
<tr>
<td>1</td>
<td>Hand Pump</td>
</tr>
<tr>
<td>1</td>
<td>Kidney Model with attachment clips</td>
</tr>
<tr>
<td>1</td>
<td>Laptop Computer</td>
</tr>
<tr>
<td>1</td>
<td>Laptop Computer Power Supply</td>
</tr>
<tr>
<td>1</td>
<td>Webcam Box</td>
</tr>
<tr>
<td>1</td>
<td>Webcam for Webcam Box</td>
</tr>
<tr>
<td>1</td>
<td>Webcam for Needlescope with Adaptor</td>
</tr>
<tr>
<td>1</td>
<td>Power strip / Surge protector</td>
</tr>
<tr>
<td>1</td>
<td>Instruction Manual</td>
</tr>
</tbody>
</table>

| **Equipment** | |
| 2 | Cuff Implantor® |
| 4 | Dilator, Small (2) Large (2) |
| 1 | Forceps, Dressing |
| 5 | Hemostat |
| 1 | Needle, Hawkins |
| 2 | Needle, Veress, disposable |
| 1 | Needle, Veress, Karl Storz reusable |
| 1 | PD Catheter Stylet |
| 2 | Retractor, US Army (set) |
| 1 | Retractor, Weitlaner |
| 2 | Tunnelor® Tool |

| **Supplies** | |
| 1 | Citrate Buffer Solution, 125 mL bottle |
| 1 | Mineral Oil, 20 mL bottle |
| 1 | Visualization Solution, 125 mL bottle |
| 1 | Conductivity Gel |
| 15 | Guides, Luke Guides |
| 2 | Guide wire, 0.035 inch by 150 cm |
| 10 | Needle, 18G (5), 21G (5) |
| 4 | Needle, Percutaneous Entry, 18G / 7 cm |
| 2 | PD Catheter |
| 3 | Scalpel, disposable |
| 10 | Syringes, assorted: 3 mL, 12 mL, 60 mL |