Total Vaginal Hysterectomy Mannequin Simulation

Clarissa Lam, MD | New York University School of Medicine
Veronica Lerner, MD, FACOG | Director of Simulation | New York University Obstetrics and Gynecology
Dominique Malacarne, MD | Fellow, FPMRS, NYU Obstetrics and Gynecology Department

Learning Objectives

By the end of this simulation, the participant should be able to
1. Identify anatomical structures
2. List the of steps in a total vaginal hysterectomy (TVH) including dissection of bladder from lower uterine segment, cervix and upper vagina
3. Explain the flow of operation and assessment of forward planning, time and motion
4. Demonstrate proper use of instruments
5. Demonstrate proper use of assistants
6. Demonstrate knot tying/ligation

Vaginal Hysterectomy Simulation Setup

Simulator: PROMPT shoulder dystocia trainer

Assembly time
45 minutes but significantly shorter if multiple simulators made at the same time.

Materials
- Most of the materials can be reused
- Most of the materials can be substituted for similar products and are easily found

Cost
Approximately $6

Step-by-step instructions on how to assemble the model
Total Vaginal Hysterectomy Mannequin Simulation

Pelvis (Figures 2-3)

Figure 3 (red circles indicating area where holes are drilled in on either side of the PROMPT trainer)
Uterus (Figure 4-7)

1. Take plastic Easter egg and completely fill it with Model Magic and two large metal nuts. (Fig. 5)
   Note: The Model Magic™ and the nuts together function to give the uterus some weight.
2. Close the Easter egg tightly and mold Model Magic around the egg using just enough material to develop an anatomically correct uterine shape. (Fig. 6)
   Note: It is best to flatten the anterior and posterior surfaces of the uterine model for anatomical accuracy.
3. Incorporate extra Model Magic™ on either side of the fundus to replicate the uterine horns. (Fig. 7)
4. Mold Model Magic™ into a cervix and attach it opposite the fundus of the uterus. (Fig. 7)
   Note: Leave a slight groove where the body of the uterus and the cervix meet in order to accommodate the attachment of a vaginal mucosa later on in the assembly of the model.
5. Allow the model to completely dry and harden. This should take anywhere from 48-72 hours, depending on the thickness of the Model Magic™ layer around the Easter egg interior.
6. Wrap the uterus in two layers of self-adhesive elastic bandage as this will ensure reusability of this portion of the model.
Total Vaginal Hysterectomy Mannequin Simulation

Figure 5

Figure 6

Figure 7
Vagina (Figures 8-9)

1. Take 4" of cloth surgical tape (3" wide) and fold it in half length-wise so that the two adhesive sides are folded against each other. Repeat this once more so that you have two separate pieces of this tape.
2. Cut 6" of stockinette and suture the end of the one of the pieces of tape to one half of the short side of the stockinette as far laterally as possible.
3. Suture the other piece of tape to the other side of the short side of the stockinette.
4. Fit the prepared vaginal mucosa around the cervix of the uterus so that the unsutured end of the stockinette comes about an inch past the uterocervical junction.
5. Place a rubber band in the groove of the uterocervical junction. Wrap the rubber band around three times to ensure the vaginal mucosa has tightly adhered to the cervix.
6. Glue the superior edge of the stockinette onto the rubber band using Krazy Glue™.
Peritoneum and Supporting Ligaments (Figures 10-14)

Note: To ensure that all tape stays adherent to the glove, it may be prudent to put a dot of Krazy Glue™ onto the piece of tape where it is adherent to the glove.

1. Cut the middle finger off of the glove. (Fig. 10)
2. Adhere the thumb and the pinky of the glove to the palm portion of the glove using Krazy Glue™. (Fig. 11)
   Note: It is best to use as little glue as possible and adhere the most proximal portion of the finger to the glove about 4 inches from the bottom edge of the glove. Because the thumb and pinky of the glove will become the uterosacral ligaments, it is necessary to keep as much free (unglued) glove material as possible.
3. To create the uterosacral ligaments, fold a 4" piece of cloth surgical tape lengthwise around the tip of the pinky and the thumb. (Fig. 12)
4. Using a scalpel, cut a hole at the end of the tape and place a cut rubber band through the hole. Tie the end of the rubber band on the lateral side. (Fig. 13)
5. Connect the two pieces of surgical tape by threading the rubber band through the other piece and tying the end in the same manner. This should secure the rubber band so that it will not slip out of the hole in the two pieces of tape created by the scalpel. (Fig. 13)
6. To create the infundibulopelvic ligaments, attach surgical tape to the index and ring fingers of the glove. (Fig. 14)
7. Suture the thread through the top of the tape and tie the thread to secure it to the fingertips. (Fig. 14)
Fallopian Tubes and Ovaries (Figures 15-16)

1. Place a piece of tape on the end of each piece of thick pink yarn.
2. Tape the yarn at the junction of the finger and the palm portion of the glove. These will be the fallopian tubes.
3. Using Krazy Glue, adhere the superior end of the fallopian tubes to the tape at the tip of the index and ring finger. Reinforce the taped end of the fallopian tubes to the glove using a dot of Krazy Glue™. (Fig. 15)
4. Cut a 4x4 gauze in half and fold each piece of cut gauze in half twice. These will be the ovaries.
5. Insert the gauze all the way to the tip of the index and ring fingers of the glove. (Fig. 16)
Combining the Uterus Model with the Peritoneum Model (Figures 17-18)

1. Flip the peritoneum portion of the model over so that the uterosacral ligaments are on the underside.
2. Insert the uterus model into the glove so that the uterine horns are flush against the opening of the index and ring fingers of the glove. Make sure the side of the vaginal mucosa with the sutured tape pieces is on the underside during this step as that side will be the posterior vaginal mucosa (and thus on the same side as the posterior uterosacral ligaments).
3. Glue the uterus to the glove at four points so that the uterus is adherent to the glove.
4. Close the hole at the middle finger location of the glove by gluing the glove to the fundus of the uterus at that point. Glue the uterine horns to the index and ring finger portions of the glove as well. (Fig. 17-18)

Uterine Arteries (Figures 19-20)

1. Cut a small hole in the lateral side of the glove inferior to the point of attachment of the fallopian tubes. This is best done approximately 1 cm below the inferior border of the tape.
2. Thread the red yarn through this hole. (Fig. 19)
   Note: Using a small mosquito clamp to grasp the yarn and thread it through the hole may be helpful at this step.
3. Create a hole on the other side of the glove and thread the yarn from the inside the glove through that hole. The yarn should be lying between the uterus and the glove.
4. Glue the yarn to the uterus and the glove at the midpoint. (Fig. 20)
Bladder (Figure 21)
1. Fill a yellow balloon with about 50 mL of water.
   Note: Make sure to release as much air from
   the balloon as possible before tying so that the balloon is not over-inflated.
2. Glue the balloon at four points to secure it near the open end of glove.
   Note: Avoid over-gluing the bladder as that will take away from the accuracy
   of the model since the bladder is actually quite mobile in real life. (Fig. 21)
Assembly steps for the vaginal hysterectomy simulator (Figures 22-24)

1. Place the completed model inside the pelvis model.
2. Thread the infundibulopelvic ligaments through the upper hole on the lateral sides of the model and thread the uterine arteries to through the lower hole on the lateral sides of model.
   Note: A mosquito clamp may be helpful at this step.
3. Attach a mosquito clamp to the infundibulopelvic ligament and the uterine artery on each side to hold them in place. (Fig. 22-23)
4. Loop the uterosacrals around the removable portion of the floor of the pelvis model. Make sure to secure this portion of the floor after this step.
5. Stretch the glove over the upper two fasteners at the vaginal end of the pelvis model. Pierce the glove at the point where the fasteners can be comfortably inserted into these holes.
6. Stretch the two pieces of surgical tape sutured onto the vaginal mucosa stockinette down to the lower two fasteners on the vaginal end of the pelvis model. Using a scalpel, cut a hole at the ends of each piece of tape and secure the fastener within these holes.
7. Stretch the upper portion of the stockinette to the upper two fasteners where the glove was just attached. Make holes at the appropriate spots in the stockinette and insert the upper fasteners into these holes.
   Note: Avoid twisting the vaginal mucosa in the process of attaching it to the fasteners.
8. Complete the assembly by fastening the existing pelvic floor onto the pelvis model.
   Note: The completed model will have redundant space between the vaginal mucosa and the inferior wall of the pelvis model. This will be eliminated once a weighted speculum is used at the start of the simulated vaginal hysterectomy.