

Title: EVALUATION OF AN ANESTHETIZED PIG VERSUS A MANNEQUIN FOR TEACHING EPIDURAL NEEDLE AND CATHETER PLACEMENT

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**Introduction.** Lumbar epidural anesthesia is being used with increasing frequency for obstetric analgesia, intraoperative anesthesia, and postoperative analgesia. To date there is no ideal model for teaching the technique to anesthesiology residents or medical students. Inexperience is one cause of failure and/or complications (e.g., inadvertent dural puncture). The purpose of the present study was to evaluate an anesthetized pig versus a mannequin as a model for teaching epidural needle and catheter placement.

**Methods.** With approval from the Animal Care Committee, anesthesia was induced and maintained in mixed breed pigs (average weight = 30 kg) by inhalation of halothane and oxygen. Each pig was placed in the left lateral decubitus position; intravenous access was established; and EKG, rectal temperature, and blood pressure monitoring was instituted. Faculty and resident anesthesiologists performed lumbar epidural needle and catheter placement, first using a "Nasco Life/Form Simulator" (model F1036UA) mannequin, and then in the anesthetized pig. Following epidural catheter placement in both models, each participant was asked to indicate his/her previous experience with epidural anesthesia and to answer seven questions regarding the appropriateness of each model. Each of the seven characteristics was rated excellent, good, fair, or poor. Finally, each participant was asked which model, if either, would be more effective for teaching the technique of lumbar epidural needle and catheter placement. Statistical analysis was by Wilcoxon signs rank test.  $P < .05$  was considered significant.

**Results.** Twenty-nine physicians participated. Their previous experience with epidural anesthesia was: <20 epidural anesthetics (n=1); 20-50 (n=5); >50 (n=23). The following table includes the percentage of participants who rated each model as excellent - good (E-G), or fair - poor (F-P).

Question #	Rating	Pig	Mannequin
1. Appearance of back	E-G	59%	28%
	F-P	41%	72%
2. Palpation of spine and interspaces	E-G	64%	46%
	F-P	36%	54%
3. Angle of needle during insertion	E-G	71%	68%
	F-P	29%	32%
4. Consistency of subcutaneous tissue and spinal ligaments	E-G	90%	24%
	F-P	10%	76%

Question #	Rating	Pig	Mannequin
5. Adequacy of loss of resistance	E-G	90%	52%
	F-P	10%	48%
6. Ease of catheter placement	E-G	80%	48%
	F-P	20%	52%
7. Overall technique	E-G	90%	24%
	F-P	10%	76%

Within the following table, column A includes the percentage of participants who rated the pig and mannequin (M) equally, column B includes the percentage of participants who rated the pig better than M, and column C includes the percentage of participants who rated M better than the pig.

Question #	A Pig=M	B Pig>M	C M>Pig	P Value
1.	41%	48%	10%	<.05
2.	29%	48%	25%	NS
3.	43%	39%	18%	NS
4.	7%	83%	10%	.0001
5.	31%	59%	10%	.001
6.	32%	48%	20%	<.05
7.	14%	79%	7%	.0001

Finally, the responses to the last question, which called for an overall opinion, were as follows: Anesthetized pig preferred 17 (59%); Mannequin preferred 2 (7%); Pig and mannequin both effective 10 (34%); Neither model effective 0 (0%).

**Discussion.** Limitations include the fact that confirmation of actual epidural location of the catheter was not possible in the pig without injection of local anesthetic or dissection, and was difficult in the mannequin, requiring disassembly. Written comments by the study participants, who were reasonably experienced in epidural needle and catheter placement, indicated that the pig model was superior in consistency of the ligamentum flavum and adequacy of loss of resistance. They found the anesthetized pig to much better simulate clinical conditions than the mannequin. We conclude that the anesthetized pig may be an effective model for teaching epidural needle and catheter placement.