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MEETING ABSTRACTS
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Porcine Model for Internal Mammary Vessels Harvesting: Anatomy and Technique

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BACKGROUND

Recipient vessels selection is crucial for successful microsurgical breast reconstruction. The internal mammary vessels (IMVs) have gained great popularity, and they are often selected as first choice recipient vessels. The IMVs can be exposed for microvascular anastomosis through a rib-removing (trans-costal) or a rib-sparing (intercostal) approach.[1–3] Because the vessels are located between the rib cage and the parietal pleura, adequate training is needed to avoid and eventually manage bleedings and pleural perforation. This training is better performed in a nonhuman model.

Our aim was to investigate the pig as a surgical model for IMVs harvesting to be used in training.[4,5]

METHODS

The procedure was performed on an adult common-breed female pig (*Sus scrofa domesticus*), weighing 25 kg, under general anesthesia and in the supine position. The rib-sparing technique was performed first (Fig. 1), followed by rib resection and further vessel dissection (Fig. 2) to simulate both techniques. An arterial side branch was deliberately cut without ligation to simulate accidental bleeding.

The procedure was recorded by means of a GoPro camera and simultaneously with a head mounted (4× magnification) Loupecam system. Photographs were taken using 2 cameras during surgery at relevant time points.

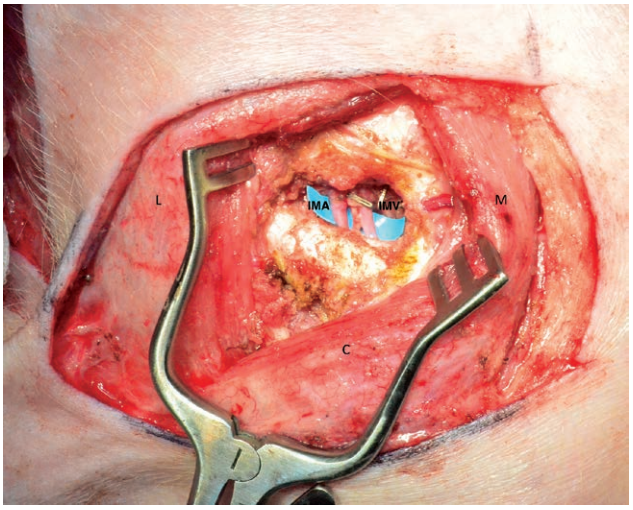

Fig. 1. Close up view of the right breast of a pig (head below, axilla on the left hand side). The surgical scenario of a mastectomy is reproduced by breast skin removal. The pectoralis major muscle is split along its fibers, which are held open with Weitlaner retractor to expose the third intercostal space. Between the 2 ribs, on the blue background, the IM artery and IMV are exposed. C, cranial; L, lateral; M, medial.

RESULTS

Under a more prominent anterior thoracic wall, pigs' IMVs showed to be slightly larger and more resistant to manipulation than those in humans. The planes of dissection are quite similar to the human model, with the exception of a thinner adipose tissue layer and the presence of a panniculus carnosus, a rudimental layer of striated muscle deep to the panniculus adiposus.

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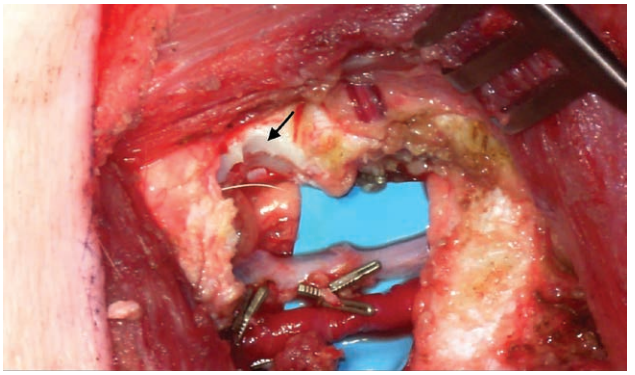

Fig. 2. Close up view of the internal mammary vessels (medial above, head on the right hand side). When the intercostal space is too narrow to perform microvascular anastomosis, a segment of the third or fourth rib cartilage can be removed (arrow) using a bone rongeur after dissecting the perichondrium off the cartilage.

The simulated bleeding was managed through side branch identification and ligation with no relevant blood loss, providing a great teaching material for the creation of our living training model.

CONCLUSIONS

Harvesting of the IMVs in the pig closely resembles the clinical scenario. The pig allows performance of both the rib-sparing and the rib-resecting techniques on the same side of the thorax at least once (which means at least 4 dissections per animal) but with the potential for harvest at multiple intercostal spaces on each side.

We believe that the pig model can be very useful because it allows training on a living (and bleeding) model—better simulating the clinical scenario than a cadaver—and avoids the risks related to learning and training in humans.

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