Constructing a Heidenhain Pouch in Pig

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It goes without saying that the pouch construction is necessary for a precise observation of the gastric secretion. In swine, however, only several papers are available in which the secretory activities of the stomach were reported [1–6]. It is also of need that a constructed pouch can be used for a long term, at least 2–3 months, and animal with the pouch be kept healthy during the term. In the most of the available reports, however, the experimental conditions were not described clearly.

One of difficulties in the postoperative care comes from an anatomical character of the swine stomach. The stomach of swine resembles a sharply bent, tapering sack. The diamond shaped region of the proper gastric glands which secrete pepsin and acid is a small portion of the stomach wall and located at the opposite site of the angle (bottom of the lesser curvature) of the syphone (Fig. 1). For this reason, a pouch construction from the proper gland region results in stenosis of the main stomach. Filling of the anterior cavity by feed may be apt to cause holding and obstruction, and animal become easy to vomit. To prevent the stenosis, the longitudinal cut edge of the stomach after pouch separation was stitched horizontally, so that the calibre of the remained portion of the stomach was enlarged.

A established method of ours for the Heidenhain pouch construction in swine was as follows. Female swine of commercial secondary SPF, 10–20 Kg of body weight, was operated under halothane anesthesia. A set of stainless steel cannula (Fig. 3) was used. A small Heidenhain pouch was made of a portion of the proper glandular stomach by a conventional method. The cut end of the main stomach was sutured transversely. After the operation, edges of hindleg hoof were trimmed and rounded, and animal was put in a post operative cloth (Fig. 4).

The operated pig was kept in a metabolic

Fig. 1. Frontal section of stomach of pig

Remarks.
A, oesophagus; B, cardiac gland region; C, fundus gland region; D, pyloric gland region; E, duodenum.
Fig. 2. Gastric juice from the pouch (white column) was sampled every 1 hr. Peptic activity was measured by the Kunitz's casein digestion method. Pepsin output (black bar) was expressed as the weight of bovine crystalline pepsin. The animal was starved for over 18 hr before the feeding. The animal housing was artificially lighted up from at 8 to 20 o'clock.

Feeding and drinking ad libitum

Secretory volume (ml)

Pepsin output (mg)

7 9 12 15 18 21 24 7 9 12 O' clock

cage and deprived of feed and water for 4 days. From the 5th day, the pig was fed twice or three times a day and allowed to drink ad libitum. The secretion from the pouch was collected as far as possible, mixed with feed and given to the pig. By this method, the Heidenhain pouch was constructed in 7 pigs, which could be used for 130, 0, 125, 120, 82, 81 and 72 days respectively. Provided the pouch usable for more than 60 days was considered as a successful case, the rate of success was 5/7. Daily secretion from a pouch was 0.3–2.5 l, a remarkably high rate in comparison with dog. An example of secretion within a day is illustrated in Fig. 2.

Main troubles in swine with the pouch and countermeasures to them were as follows.

Drop out of cannula: Two to three times of reoperation were possible. It is commonly necessary to close the old hole and protrude the cannula from a new place.

Erosion of the skin: The skin around the cannula easily suffered from erosion by a minute amount of leakage of the gastric secretion. To prevent the erosion, vaseline ointment was applied to the skin around the cannula routinely. If erosion was diagnosed, surgical treatment were carried out as far as possible. Since the main cause of the drop out of cannula was the kicking by the hindlegs, wearing of the postoperative cloth and rounding of hoof edges were markedly effective to reduce the incidence.

Water and electrolyte balance: Daily amount of secretion from a pouch roughly corresponded with the blood volume. Without correction, the pig might suffered from a severe metabolic alkalosis. In our experience, pH of urine went up to above 8.0 in such a case. Although the correction of such an amount by infusion was quite difficult, the pig ate well the feed mixed with peptic secretion fortunately. In the case of failure to collect the secretion, a doubled
volume of estimated secretion of 0.05N HCl was mixed with feed and given. Use of female pig was essential for the collection of the secretion.

References

要約
プタにおけるハイデンハイン小胃の作製法（短解）：藤田正一郎・小久栄一・谷山豊秋（東京農工大学農学部家畜薬理学教室）—以下の一貫的な改良を加えることによって、2ヶ月以上供試可能なプタのハイデンハイン小胃の作製に成功した。①主胃の切断端は transverse 線合する。②体液平衡保持のため、流出する小胃からの胃液は可能なかぎり採取してプタに飲ませる。③カニューレの脱落を防ぐため：後肢の蹄先端を饨にする。覆帯を装着する。カニューレ開口部の皮膚の erosion を治療する。

Explanation of Figures

Fig. 3. A set of stainless steel cannula.

Fig. 4. The operated pig with a post operative cloth in a metabolic cage.