

# Use of Elastrator® rings to repair umbilical hernias in young swine

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## Summary

The objective of this study was to evaluate the efficacy and applicability of using Elastrator rings (Elastrator; Heiniger International, Switzerland) to repair umbilical hernias in swine. Ten 2- to 3-month-old gilts (Large White × Italian Landrace) with umbilical hernias were heavily sedated and placed in dorsal recumbency. After manual reduction of the hernia in each animal, two Elastrator rings were applied on the hernial

sac, close to the abdominal wall. Animals showed no signs of post-treatment pain. In eight animals, the hernial sac separated at 21 to 28 days post treatment. These animals were marketed at a mean age of  $220.5 \pm 8.25$  days and an average weight of  $171 \pm 7$  kg. Repair was unsuccessful in two animals.

The use of Elastrator rings to repair recently diagnosed umbilical hernias appears to be an effective method in commercial swine.

The technique is simple and inexpensive, and animals need no special care.

**Keywords:** swine, umbilical hernia, Elastrator®

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## Resumen – Uso de anillos Elastrator® para reparar hernias umbilicales en cerdos jóvenes

El objetivo de este estudio fue evaluar la eficacia y aplicabilidad del uso de anillos Elastrator (Elastrator; Heiniger International, Switzerland) para reparar hernias umbilicales en cerdos. Diez hembras de 2 a 3 meses de edad (Large White × Italian Landrace) con hernias umbilicales fueron fuertemente sedadas y colocadas en decúbito dorsal. Después de la reducción manual de la hernia en cada animal, se aplicaron dos anillos Elastrator en el saco hernial, cerca de la pared abdominal. Los animales no mostraron signos de dolor post tratamiento. En ocho animales, el saco hernial se separó a los 21 a 28 días post tratamiento. Estos animales fueron vendidos a una edad promedio de  $220.5 \pm 8.25$  días y a un peso promedio de  $171 \pm 7$  kg. La reparación fracasó en dos animales.

El uso de los anillos de Elastrator para reparar hernias umbilicales recientemente diagnosticadas parece ser un método efectivo en cerdos comerciales. La técnica es simple y de bajo costo, y los animales no necesitan de cuidado especial.

## Résumé – Utilisation des anneaux Elastrator® pour la réparation d'hernies ombilicales chez les jeunes porcs

L'objectif de la présente étude était d'évaluer l'efficacité et la faisabilité d'utiliser les anneaux Elastrator (Elastrator; Heiniger International, Suisse) pour la réparation d'hernies ombilicales chez le porc. Dix cochettes âgées de 2 à 3 mois (Large White × Landrace Italien) avec des hernies ombilicales ont été mises sous sédation profonde et placées en décubitus dorsal. Après réduction manuelle de l'hernie chez chaque animal, deux anneaux

Elastrator ont été placés sur le sac herniaire, près de la paroi abdominale. Les animaux n'ont présenté aucun signe de douleur post-traitement. Chez huit animaux, le sac herniaire s'est détaché 21 à 28 jours post-traitement. Ces animaux ont été mis sur le marché à un âge moyen de  $220.5 \pm 8.25$  jours et à un poids moyen de  $171 \pm 7$  kg. La réparation n'a pas réussi chez deux des animaux.

L'utilisation d'anneaux Elastrator afin de réparer les hernies ombilicales diagnostiquées tôt semble une méthode efficace chez les porcs commerciaux. La technique est simple et peu dispendieuse, et les animaux ne nécessitent aucun soin particulier.

Umbilical hernia is one of the most common developmental defects in swine.<sup>1,2</sup> Herniated pigs represent an economic loss, as they are generally sold at a lower price and slaughtered at a younger age due to the risk of ulceration and abscessation of the hernial sac or strangulation of the hernial contents.<sup>1,3,4</sup> Hernia repair would permit recovery of affected animals and limit economic loss, although surgical intervention is expensive compared to the market value of the animal.<sup>3,4</sup> As an alternative, Hall<sup>3</sup> described a rapid and inexpensive method to reduce umbilical hernias in swine, consisting of topical application of concentrated nitric acid onto the hernial sac followed by isolation of the

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treated animal in a bedded pen for about 21 days. Another possibility for treatment of umbilical hernias is the application of Elastrators (Heiniger International, Switzerland) as described in foals.<sup>5</sup> The aim of the present study was to assess whether the Elastrator technique could be used to reduce recently diagnosed umbilical hernias in young swine. This trial was authorized and conducted under the supervision of the Bioethical Committee of the Faculty of Veterinary Medicine of the University of Turin.

## Case description

Ten Large White × Italian Landrace females with congenital hernias were purchased from a private farm at an average of  $77.0 \pm 13.5$  days of age and average body weight of  $49.1 \pm 8.1$  kg. These gilts would have been slaughtered at an early age on the farm of origin because of their hernias. They were housed in the training and experimental station of the Faculty of Veterinary Medicine, an indoor facility, at the University of Turin, and it was expected that after hernia repair, they would be slaughtered at the customary Italian market weight of 170 kg.

Animals were divided into two groups of five gilts, with each group housed in a 15-m<sup>2</sup> pen with five other healthy females from the same source and of similar age and weight. Pens had atraumatic plastic-coated slotted metal floors and concrete walls. During the study, all animals were fed a commercial pelleted finishing ration. Relevant data for all animals are detailed in Table 1.

Two days before the trial began, the hernial sac of each study animal was examined for fistulas or skin lesions. At palpation, hernial sacs had a soft texture and the contents could be easily reduced. During this manipulation, animals showed no signs of pain or distress. Body temperatures were normal,<sup>6</sup> ranging from 38.8°C to 39.1°C.

## Application of Elastrators

Sedation was induced with azaperone, 4 mg per kg (Stressnil; Janssen Pharmaceutical, Beerse, Belgium), administered by IM injection in the neck area. The five animals in each group were injected one after another. After sedation, each animal was placed on its right side and the width and length of the hernial sac were measured using a tape measure. Beginning 10 to 13 minutes after injection, each animal was

placed in dorsal recumbency and the hernia was reduced by digital pressure. The diameter of the hernial ring was measured with a calliper. Subsequently, using a spring-loaded Elastrator applicator, two Elastrator rings were placed carefully around the hernial sac as close to the abdominal wall as possible. We found it helpful to grasp the

hernial sac using atraumatic surgical forceps while the Elastrator rings were placed (Figures 1 and 2). The same procedure was applied to the second group of five animals. The mean time required to reduce hernias and place Elastrator rings was  $2.25 \pm 0.59$  minutes per animal. At the end of the procedure, in order to allow treated animals to

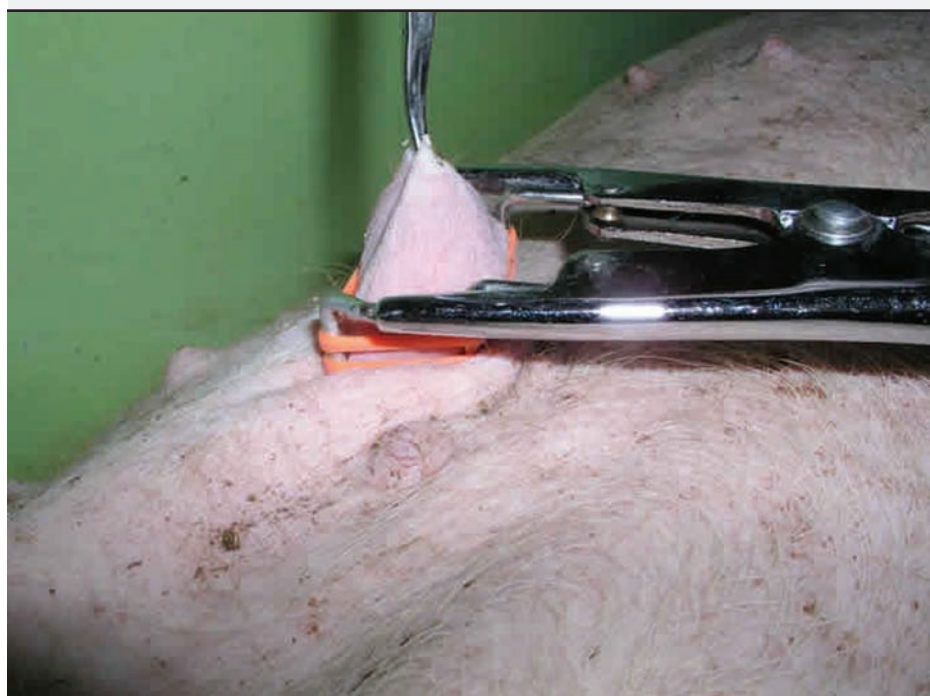
**Table 1:** Data collected 2 days before umbilical hernia repair in 10 Large White × Italian Landrace gilts

Age (days)	Body weight (kg)	Body temperature (°C)	Hernial sac size* (cm)	Internal ring size† (cm)
60	40	39.1	10 × 8.5	3.0
60	40	39.0	11 × 9	3.8
60	43	38.9	12 × 9.5	3.5
70	44	39.0	8 × 6	2.7
75	45	39.0	9 × 6	2.5
85	55	38.8	10 × 9	4.0
90	50	38.8	5 × 4	1.5
90	51	38.9	5 × 4	2.5
90	61	38.7	4 × 3	2.8
90	62	38.8	9 × 7	2.0

\* Maximal width and length measured by tape measure.

† Diameter of internal hernia ring measured with a calliper.

**Figure 1:** Umbilical hernia repair using two Elastrator rings. The gilt has been placed in dorsal recumbency after heavy sedation. The hernia has been manually reduced, and the hernial sac is held up using atraumatic forceps after placement of the Elastrator applicator.



fully recover from sedation, all gilts were housed in individual pens for 12 hours before returning to their original pens.

### Outcome of hernia repair using Elastrator rings

Animals were examined daily until the hernial sac separated from the abdomen. No behavioural differences were noted between treated animals and normal penmates. No signs of pain or discomfort or systemic signs were observed (eg, depression, inappetence, prolonged recumbency, self-isolation, self-mutilation, or cannibalism of hernial sacs) (Figure 3). Four to 5 days post treatment, the hernial sacs became noticeably discoloured (appeared cyanotic). Ischemic necrosis became evident 5 to 6 days post treatment and hernial sacs were completely necrotic by day 7 (Figure 4). During this period, animals showed no signs of pain or discomfort when hernial sacs were palpated. As observed in similar studies conducted in foals,<sup>5</sup> transitory edema and swelling were observed around the area of Elastrator application between 5 and 21 days post treatment.

Recovery was uneventful for eight pigs. Separation of the hernial sac and the Elastrator occurred between 21 and 28 days post treatment (Figure 5). Average daily gain of these eight animals ( $791 \pm 17$  g) was comparable to that of the nonherniated penmates ( $802 \pm 7$  g). Mean slaughter weights of treated and healthy animals were  $171 \pm 7$  kg and  $177 \pm 6$  kg, respectively, at an average age of  $220 \pm 8$  days.

In two animals, treatment was unsuccessful. At day 7, edema developed between the Elastrator rings and the abdominal wall, pushing the Elastrator rings towards the distal tip of the hernial sac (Figures 6 and 7). These animals were sedated and underwent a second placement of Elastrator rings; however, hernias recurred a few days later in both animals.

### Discussion

These preliminary results indicate that reduction of recently diagnosed umbilical hernias with Elastrator rings may be an effective therapeutic method in commercial swine. A total of 2324 mg of azaperone (approximately \$0.008 per mg; all currency in \$US converted from Euro dollars) and 24 Elastrator rings (approximately \$0.013 each) were used for 12 hernia repairs, an overall cost of approximately \$18.90, with

**Figure 2:** Hernial sac after placement of Elastrator rings.



**Figure 3:** Day 3 after placement of Elastrator rings on an umbilical hernia.



**Figure 4:** Day 7 after placement of Elastrator rings on an umbilical hernia, showing necrosis of hernial sac.



**Figure 5:** One of eight gilts successfully treated for umbilical hernia using Elastrator rings. In each gilt, the necrotic hernial sac separated from the abdomen at 21 to 28 days post treatment.



**Figure 6:** Gilt unsuccessfully treated for umbilical hernia using Elastrator rings, showing the rings slipped to the distal area of the hernial sac.



**Figure 7:** Unsuccessful treatment of umbilical hernia using Elastrator rings. Edema in the area where the rings were applied caused them to slip toward the distal part of the hernial sac.



an average cost of approximately \$2.36 for each successfully treated animal. The overall working time required to treat 10 animals was about 50 minutes, including the lag time between azaperone injection and hernia reduction and Elastrator application.

This technique appears cheaper, faster, and simpler to perform than other published methods.<sup>3,4</sup> Moreover, in contrast to other methods,<sup>3,4</sup> treated animals need no special care (eg, drug administration, individual housing during the healing period, bedded pens).

Further studies involving larger numbers of herniated pigs of both sexes and of different ages are in progress to better evaluate the feasibility of this technique under field conditions.

## Implications

- Evidence from a small number of treated animals suggests that Elastrator rings may be useful for nonsurgical repair of umbilical hernias in commercial swine 2 to 3 months of age.
- Repair of umbilical hernias using a low-cost, nonsurgical method allows recovery of the economic value of successfully treated animals.

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