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MORTALITY RATES FOLLOWING DEUTECTOMY IN ANAESTHETIZED AND NON-ANAESTHETIZED DAY OLD CHICKS

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المستخلص

أجريت هذه الدراسة لإيجاد تقنية قياسية لإزالة كيس المح المتبقي جراحياً فى الكتاكيت حديثة الفقس. تم إجراء خمسة عشر محاولة، سبعة محاولات منها بإستخدام الإيثر كمخدر وثمانية محاولات من غير تخدير، حيث بلغت نسبة النفوق فى الكتاكيت التى أخضعت للتخدير بالايثر بين 40-87.5 % (متوسط 56.7 %)، بينما تراوحت النسبة بين 0-60 % (متوسط 10.3 %) عند إجراء العملية بدون تخدير. إنخفضت نسبة النفوق بصورة ملحوظة بتكرار التجربة وزيادة عدد المحاولات فى المجموعة التى لم تخضع للتخدير.

Abstract

This study was conducted in an attempt to standardize a technique of surgical removal of the residual yolk sac in newly hatched chick. Fifteen Attempts were made (7 using Ether as anaesthetizing agent and 8 without anesthesia). Mortality rates among the anaesthetized chicks ranged between 40-87.5% (average 56.7 %), which in the non- anaesthetized group was between 0-60% (average 10.3%) . The mortality rates decreased with increasing the experience (number of trials) in the non-anaesthetized ones.

Key words: Newly hatched Chick, Residual yolk sac, deutectomy anesthesia

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Introduction

The residual yolk sac is the only extra-embryonic membrane, which plays significant roles during both embryonic and post-hatch lives. To study its physiological effects, the residual yolk sac should be surgically removed by an operation known as "deutectomy".

Parker (1929) used deutectomy to study the effects of handicaps on the development of chicks, he operated on anaesthetized chicks. Sloan (1936) modified parker's technique and proved that anesthesia was unnecessary and even detrimental. He recorded the survival of the chicks was about 97%.

Menge *et al.,* (1951) removed the yolk sac through a small cut in the anterior edge of the umbilicus. Nevertheless, Parker (1929) and Sloan (1936) made incisions in the abdomen away from the umbilicus.

The technical alterations described by Harvey *et al.,* (1955) were made primarily in the interest of speed. An operating block was devised by Harvey *et al.,* (1955), upon which the chick could be immobilized upon its back with its legs extended posterior; by straps of bias tape across the thorax and each leg. Then, the down was trimmed by scissors from an area about 12 mm in diameter around the umbilicus. Trimming adopted by Harvey *et al.,* (1955), was found to be more rapid and less disturbing to the chicks than plucking as described by Sloan (1936).

The site of the incision described by Harvey *et al.* (1955) was just anterior to the umbilicus and about 9 mm to the right of the mid-line. It was anterior to and smaller than that chosen by Sloan (1936). In an attempt to avoid subsequent protrusion of the intestine, an incision length of not more than 0.8 mm in length was recommended by Harvey *et al.,* (1955). However, Sloan (1936) and Menge *et al.,* (1951), recommended incision length of 0.9 mm and 0.6 mm in length, respectively.

Harvey *et al.,* (1955), made 9 trials during 2 years to investigate the influence of deutectomy on mortality rate. The livability of the deutectomized chicks was increased markedly with experience.

Later, Turro *et al.,* (1994) performed deutectomy in anaesthetized chicks by using ether as anaesthetizing agent. They made an incision of 1.5mm in length posterior to the umbilicus. Instead of cauterizing the yolk stalk after it had been severed, Harvey *et al.* 1955 and Turro *et al.* 1994 tied the yolk stalk with silk thread before severing it from the yolk sac. The

mortality reported by Turro *et al.* (1994), was nill among the deutectomized chicks compared to the intact ones.

Recently, some studies have been carried out to investigate the physiological roles of the residual yolk sac during post-hatch life using deutectomy technique (Ali et al., 2007; Ali et al., 2011).

Since further efforts should be done to investigate the physiological roles of the residual yolk sac by using deutectomy, standardized illustrative steps describing this operation could efficiently contribute to this area of research.

Materials and Methods

Experimental Birds, Housing and Feeding

Three hundred ninety nine commercial unsexed Lohman, one-day old broiler chicks were employed in this study. They were kept in a brooder house, at the Department of Physiology, Faculty of Veterinary Medicine, University of Khartoum, where water and feed were provided ad libitum. Artificial and natural light was provided 24 hr/day.

This study extended over 2 years during which the data were collected from 15 attempts.

Operation technique

1. Preparation and immobilization of the chick

The down was trimmed at the area around the umbilicus using fine scissors and was disinfected with 5% tincture of iodine. The chick was immobilized upon its back on the left hand of the operator with its legs extended posterior by the left hand fingers. The chick´s head was immobilized and controlled between the index and the middle fingers (Fig. 1)

2. Site and length of the incision

A five mm incision was made in the skin at the same level of the umbilicus, just to the right side, using scalpel blade size 15 (Fig. 2). To overcome the protrusion of the intestine, which is the main obstacle, a horizontal mattress suture of silk (size 3/0, length 0.9 m, needle 25 $^{1/2}$ C) was made without making stitch in the incision with the aid of an assistant (Fig. 3).

3. Opening of the peritoneum

An incision of 2 mm in length was made in the peritoneum. Immediately following the opening of the peritoneum, the residual yolk sac began to protrude by the chick's expiratory efforts (Fig. 4).

4. Removal of the residual yolk sac

The residual yolk sac was completely removed from the chick's abdominal cavity by the help of the thumb and forefinger (Fig. 5 and 6). When necessary, a blunt thump-forceps was used. To prevent bleeding, the yolk stalk was tied with the aid of an assistant by using catgut thread (size 5/0). Eventually the residual yolk sac was severed from the yolk stalk and stitch was made by using the loose silk to close the incision (Fig. 7).

The operation lasted within 5-10 minutes. When anaesthesia was not applied, the chicks recovered from the stress of the operation within 1/2 hour and it started normal feeding and drinking (Fig. 8).

Results and Discussion

The Mortality Rate without using anesthesia

The average mortality rates of chicks subjected to deutectomy without anaesthesia were computed from 8 attempts (total of 205 chicks; 165 deutectomized chicks and 140 intact ones as control) to be around 10.3% and 3.5% in deutectomized and intact chicks, respectively (Tab.1). Noteworthy, the mortality rate decreased significantly with increasing the number of trials (positive experience impact) as it has been mentioned by Turro et al (1994). It was found that restraining the chick by the left hand of the operator made the operation easier and more comfortable to the chick, rather than strapping the chick in a block as described by Harvey (1951). Based on this experience, the main obstacle in deutectomy is the protrusion of the residual yolk sac and the associated intestine immediately after making the incision. This was overcome by making a vertical incision just to the right side of the umbilicus. Moreover, a horizontal mattress suture of silk without making a stitch in the abdominal incision, before opening the peritoneum, (for adjusting the diameter of the incision) could efficiently solve this problem.

Effect of anaesthesia

Seven attempts, in which 194 chicks (102 deutectomized chicks and 92 intact ones as control), were employed to see the effect of anaesthesia on

conduction of deutectomy. As it has been shown in table (1), the average mortality in anaesthetized chicks subjected to the operation reached 56.7%. On the other hands, the average mortality rate of chicks subjected to the same operation without anesthesia was 10.3%. Therefore, it was clear that using ether as anaesthetizing agent during deutectomy could be considered as life threatening agent for the chicks. This is in contradiction with the finding of Turro *et al.*, (1994) but it is in line with the findings of (Sloan 1936).

Fig. 1: Photograph of restrained chick showing the site of the operation after being trimmed and sterilized with 5% tincture of iodine.

Fig. 2 Photograph showing the sit of the incision

Fig. 3 Photograph during suturing the lips of the incision with silk but without making stitch

Fig. 4 Photograph showing protrusion of the residual yolk sac

Fig. 5 Photograph during the removal of the residual yolk sac by using the thump and the forefinger.

Fig.6 Photograph after the complete removal of the residual yolk sac and the yolk stalk was tied with catgut.

Fig. 7 Making stitch by using the loose silk to close the incision after the complete removal of the residual yolk sac

Fig. 8 Recovered deutectomized chicks and the removed residual yolk sac.

Tab. 1 show the effect of deutectomy with or without anesthesia on mortality rate of newly hatched chicks reared up to one week.

Trial (No).	**Mortality rate of Intact chicks** (%)	**Mortality rate of Deutectomizd chicks without anaesthesia** (%)	**Mortality rate of Deutectomizd chicks with anaesthesia** (%)
1	10	60	87.5
2	0	40	66.6
3	5	15	60
4	0	08	40
5	10	0	50
6	3.3	2.5	42.8
7	0	0	50
8	5	3.3	-
Mean	**3.5%**	**10.3%**	**56.7%**

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