

Effectiveness of Surgical Interventions for Self-Sucking in Dairy Cattle: A Comparative Study**Mohamed W. El-Sherif^{*}, Mahmoud S. Saber, Mohamed A. Abd Elkawy, Mahmoud A. Hassan**

Department Of Surgery, Anesthesiology and Radiology, Faculty of Veterinary Medicine, New Valley University, Alkharga, New Valley, 72511, Egypt.

Abstract

Self-sucking behavior in cows, is a behavioral defect that leads to significant milk loss in dairy farming. This retrospective case series aims to present the surgical experience and long-term outcomes of 200 cows exhibiting self-sucking behavior. The objective of this study is to evaluate the outcomes of four surgical techniques used to treat self-sucking in cows, including wound healing, complications, recurrence, and feeding difficulties. The follow-up period extended up to 2 years postoperatively, with repeated visits by the same surgeon. The study included 200 cows of mixed and native breeds. Four surgical techniques were employed to address self-sucking behavior. The same surgeon monitored the outcomes over time, assessing factors such as wound healing, complications, recurrence rates, and feeding difficulties. Long-term analysis revealed that the more invasive techniques, such as lateral glossectomy and ventral partial glossectomy, demonstrated the highest success rates at 100% and 96% respectively. In contrast, the less invasive techniques, ventral lingual inverting sutures and intralingual sutures, had success rates of 58% and 50% respectively. This study provides valuable insights into the long-term outcomes of various surgical techniques for correcting self-sucking behavior in cattle. The results indicate that lateral partial full thickness glossectomy yielded favorable outcomes with no recurrence and minimal postoperative complications. The findings from this study offer important considerations for decision-making regarding the optimal surgical correction of self-sucking in cattle, assisting veterinarians and farmers in selecting the most effective approach.

Keywords:; Dairy cattle; Glossectomy; Self-sucking; Surgery.

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*Corresponding Author: Mohamed W. El-Sherif E-mail: mohamedelsherif@vet.nvu.edu.eg

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Introduction

Self-sucking in cows, which refers to the act of a cow sucking on its own teats, poses a significant economic burden in the livestock industry. The underlying causes of this behavior are not yet fully understood, although several potential predisposing factors have been suggested, including genetics, nutritional deficiencies, feeding practices, and housing systems (Bademkiran et al., 2008). It has been proposed that self-sucking may originate from habits established during calthood (Keil et al., 2001). The incidence of self-sucking affects approximately 49% of dairy farms, while inter-sucking affects up to 40% (Lidfors and Isberg, 2003).

Various conservative measures have been proposed to prevent self-sucking, but their success rates vary (Abou-El-Ella, 1999). However, these measures often prove ineffective for inter-sucking and can potentially cause harm to other animals, making the affected cows less valuable in the market (Abou-El-Ella, 1999 and Allmacher, 1998). To address this abnormal behavior, several surgical procedures have been suggested, including the removal of an elliptical portion of the sublingual mucosa and muscle followed by suturing the wound (Bademkiran et al., 2006), partial full-thickness glossectomy (McCormack, 1976 and Abou-El-Ella, 1999), or amputation of half the tip of the

tongue (Tadmor and Ayalon, 1972 and Dietz and Ludwig, 1979).

More recently, less invasive techniques have been developed to prevent tongue cupping, such as the application of multiple inverting sutures to the ventral aspect of the tongue (El-Sherif, 2018), intralingual sutures (Seddek et al., 2019), and the use of a through-tongue device (Salman et al., 2022). These techniques have been evaluated in limited follow-up periods, typically averaging six months.

The present study aims to provide insights into the surgical experience and long-term follow-up of cows treated for self-sucking, utilizing various surgical techniques.

Materials and Methods

The methodology for this study was conducted in accordance with the guidelines and regulations set forth by the animal ethics committee of New Valley University's faculty of veterinary medicine. Approval was obtained to carry out the surgical procedures and utilize animal subjects in this research.

The study evaluated four different surgical techniques, namely lateral full thickness glossectomy (50 cows), ventral partial glossectomy (50 cows), ventral lingual inverting suture (50 cases), and intralingual suture (50 cases) fig. 1.

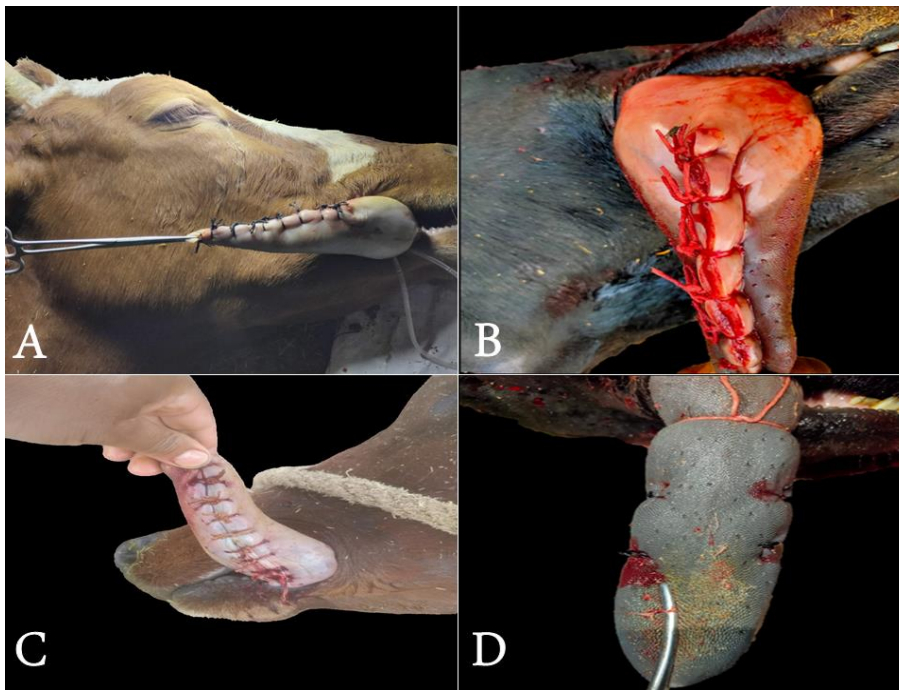


Fig.1. Surgical techniques, A- lateral full thickness glossectomy, B- ventral partial glossectomy, C- application of inverting sutures to the ventral aspect of the tongue, and D- intralingual suture application

Ventral glossectomy procedure, according to (Bademkiran et al., 2006)

The animal is appropriately restrained and positioned in lateral recumbency. The tongue is carefully pulled to one side of the mouth to provide better access for the surgical procedure. Local anesthesia is administered through the infiltration of the ventral aspect of the tongue using a 10 ml solution of 2% lidocaine (Lidocaine 2%, Hospira Inc., USA). A ventral elliptical incision is made in the ventral mucosa and muscles of the tongue, beginning at the base and extending towards the tip. This incision allows for adequate exposure, dissection, and excision of the targeted lingual tissue. During the excision, any bleeding vessels encountered are meticulously ligated to ensure hemostasis and prevent excessive bleeding. Following the complete excision of the targeted tissue, the surgical site is closed using non-absorbable sutures, typically using Silk number 0. The sutures are placed in an interrupted simple pattern, ensuring proper alignment and tension to facilitate optimal healing of the surgical site.

Lateral full thickness glossectomy procedure, according to (Bademkiran et al., 2006)

The animal is properly restrained and positioned in lateral recumbency to ensure stability and control throughout the surgical procedure. To facilitate optimal access, the tongue is gently repositioned to one side of the mouth, enabling improved visualization and manipulation. Local anesthesia is administered by infiltrating the dorsal and ventral aspects of the tongue with a 15 ml solution of 2% lidocaine (Lidocaine 2%, Hospira Inc., USA). A full-thickness incision is made on the lateral side of the tongue, running parallel to its longitudinal axis. The incision begins by penetrating through the mucosal layer and extends through the underlying muscles. Subsequently, the incision is extended laterally, perpendicular to the initial incision, allowing for complete excision of a full-thickness portion of the tongue tissue. During the excision, any encountered bleeding vessels are meticulously ligated to ensure hemostasis and prevent excessive bleeding. The

surgical site is then closed using non-absorbable sutures, typically silk number 0, placed in a simple interrupted pattern, ensuring proper alignment and tension for optimal wound healing.

Application of inverting sutures to the ventral aspect of the tongue, according to (El-Sherif, 2018)

The ventral aspect of the tongue is exposed, and the tip is grasped with atraumatic forceps. Local anesthesia is administered by infiltrating 5 ml of 2% lidocaine hydrochloride (Lidocaine 2%, Hospira Inc., USA) 1 cm lateral to the median raphe of the tongue. Instruments required include a half-circle round needle, non-absorbable suture material, needle holder, and scissors. The ventral aspect of the tongue is cleaned with sterile saline solution and dried with a sterile towel. Each single interrupted stitch is made by taking a bite (0.5 cm) of the mucosa and deep into the muscle on one side of the tongue, crossing over to the other side, and tying a square knot twice to invert the edges. Stitches are placed 0.5 cm apart. The first stitch is placed near the frenulum linguae, and stitching progresses rostrally, with the last stitch about 3 cm caudal to the tongue tip. The stitches are checked for tightness and to ensure no gaps between the edges of the tongue. The midline portion of the tongue where blood vessels are located is avoided. The tongue is irrigated with sterile saline solution and betadine mouthwash. The tourniquet is removed, and the tongue is checked for bleeding or complications. The modified contour of the tongue prevents it from forming a "U" shape for sucking. The tongue is then replaced into the mouth cavity, and the cow is allowed to stand up.

Application of intralingual horizontal

sutures, according to (Seddek et al., 2019)

In the intralingual sutures technique, local anesthesia was administered at the base of the tongue using 10 ml of lidocaine HCl 2% (Lidocaine 2%, Hospira Inc., USA). Stab incisions were made on the dorsal lingual mucosa to create a rectangle stitch in rostral and caudal rows. A sterile round needle threaded with silk No. 2 was used to pass through the stabs, creating a stitch that traversed under the ventral and dorsal lingual mucosa. The knot was secured to induce the desired convexity of the dorsal lingual surface. The tongue's ability to curl was tested before securing the knot, and once satisfactory, the knot was buried in the tissue. Stab incisions were closed with cross mattress stitches using polyglactin 910 No. 0. (Vicryl™, Ethicon, USA)

All surgical procedures were performed by the same experienced surgeon to ensure consistency. The evaluation of the techniques focused on several key factors, including feasibility, duration of the procedure, intraoperative complications, and cost considerations.

Following the surgeries, the postoperative progress of all cases was closely monitored by the same surgeon for a period of 10 days. This initial monitoring phase was followed by a comprehensive two-year long-term follow-up evaluation. The evaluation process involved a combination of clinical assessments and telephone interviews with the owners. The assessments encompassed various aspects such as short-term postoperative complications, feeding status, body score, recurrence of self-sucking behavior, inter-sucking habit, and the opinions of the owners regarding the outcomes of the surgical interventions.

To ensure the accuracy and reliability of the findings, meticulous documentation of all relevant data was maintained throughout the study. Subsequently, a thorough analysis of the collected data was performed to provide a comprehensive overview of the different surgical techniques and their respective outcomes.

Results

The results of the present study demonstrate the effectiveness of all four surgical techniques employed for correcting self-sucking behavior in cattle. The intralingual suture technique proved to be a non-invasive and cost-effective approach, with minimal bleeding and complications. Within one day of the surgery, animals treated with this technique exhibited normal feeding patterns. The procedure time for this technique ranged from 10 to 15 minutes.

The ventral lingual inverting suture technique had a slightly longer operative time of 15 to 20 minutes and resulted in swelling of the ventral aspect of the tongue. However, all treated cows resumed normal feeding within 12 hours after the operation. Complete healing was observed within 2 weeks for all cases.

Both the lateral glossectomy and partial ventral glossectomy techniques, despite being invasive, demonstrated a high success rate, with no recurrent cases reported for lateral glossectomy and only 4% recurrence for partial ventral glossectomy. These techniques required a longer healing time, with complete healing taking more than 4 weeks. Although the ability of the cows to prehens food was not impaired, normal prehension was delayed for 24 hours in cases treated with lateral glossectomy and partial ventral glossectomy.

The study findings also revealed a high incidence of self-sucking in mixed breed cows (93%) compared to native breed cows (7%). Among the cows, adult cows had the highest incidence of self-sucking (83.5%) compared to heifers (16.5%). These findings provide valuable insights for decision-making regarding the optimal surgical correction of self-sucking behavior in cattle.

Overall, the study outcomes underscore the efficacy of the evaluated surgical techniques and offer important considerations for veterinarians and farmers in selecting the most suitable approach for addressing self-sucking in cattle. Results are summarized in table 1.

Table 1: Surgical approaches and evaluation process

| | Breed | Age (heifer/adult) | Operation time intake | complication | Food intake | Recurrence |
|---|---------------------------------|--------------------------------|-----------------------|--------------------------------------|--|------------|
| Partial full thickness apicectomy 50 cases | (Mixed 46 (92%) Native 4 (8%) | Heifer 11 (22%) Adult 39 (78%) | 10-15 min | Nil | Normal food intake after 24 h | Nil |
| partial ventral glossectomy 50 cases | (mixed) 42 (84%) Native 8 (16%) | Heifer 8 (22%) Adult 42 (78%) | 15-35 min | 4 cases Wound dehiscence. (8%) | 4 cases (8%) showed a decrease in food intake during first 2 w | 10 (20 %) |
| ventral lingual inverting sutures 50 cases | (mixed) 48 (96%) Native 2 (4%) | Heifer 4 (8%) Adult 46 (92%) | 15-20 min | 17 cases Infection and abscess (34%) | 17 cases showed a decrease in food intake during first 2 | 21 (42 %) |

| | | | | | | |
|---|---|--|-----------|------------|---|-----------|
| intralingual suture 50 cases | (mixed) 50 (100%) | Heifer 10 (20%) Adult 40 (80%) | 10-15 min | Nil | w (34%) Normal food intake after 12 h | 25 (50 %) |
| Total 200 | (mixed) 186 (93%) Native 14 (7%) | Heifer 33 (16.5%) Adult 167 (83.5%) | 10-35 min | 21 (10.5%) | 21 cases showed a decrease in food intake during first 2 weeks (10.5%) | 46 (23 %) |

Discussion

Self-sucking behavior in dairy cattle is a significant problem that not only results in milk loss but also leads to udder damage, mastitis, and the eventual culling of breeding animals (Seddek et al., 2019). Despite attempts to address the issue through isolation and the use of bull rings with spikes, the problem persists and can even spread through mimicry. As a result, surgical interventions are increasingly being considered as a more reliable long-term solution (Abou-El-Ella, 1999; Bademkiran et al., 2006; Ducharme et al., 2017).

This study is not only evaluating the different surgical techniques and observed varying outcomes but also considered the context provided by previous studies. These earlier studies presented various surgical techniques and demonstrated their surgical steps (El-Sherif, 2018; Seddek et al., 2019). However, newly emerged surgical approaches have focused on the presentation of less invasive techniques (El-Sherif, 2018; Seddek et al., 2019 and Salman et al., 2022;). Moreover, a recently conducted study examined the behavioral changes that occur after each surgical technique. This study shed light on the challenges faced by patients during the recovery period and helped us gauge the overall effectiveness of the techniques.

The present study goes beyond previous research by focusing on long-lasting follow-up of patients who

underwent different surgical techniques. Our aim is to identify the most optimal technique with special reference to recurrence rates, postoperative complications, and overall accuracy, regardless of the invasiveness of the technique.

Among the evaluated techniques, partial ventral glossectomy and partial full thickness apicectomy exhibited the highest success rates, with recurrent cases reported at only 4% and 0% respectively over the two-year follow-up period. However, these techniques were associated with complications such as bleeding and infection (Yong et al., 2008). On the other hand, techniques involving silk stitches as described by (El-Sherif, 2018; Seddek et al., 2019) showed a lower success rate and a higher risk of infection due to the prolonged use of nonabsorbable suture material (Ducharme et al., 2017). Our results were consistent with these findings, as ventral lingual inverting sutures resulted in 34% post-operative complications and 42% recurrence rate, while the intralingual suture technique had a recurrence rate of 50%.

Interestingly, lateral glossectomy demonstrated the highest success rate at 100% with no recurrent cases, while ventral partial glossectomy showed a success rate of 96%. However, this discrepancy may be attributed to the possibility of insufficient excision of the lingual mucosa in cases treated with

ventral partial glossectomy (Bademkiran et al., 2006). Furthermore, our data indicated that self-sucking behavior was more prevalent in adult cows (83.5%) compared to heifers (16.5%), which contrasts with the findings reported by (Mahmoud et al., 2016).

Overall, our study highlights the effectiveness of different surgical techniques for addressing self-sucking behavior in dairy cattle. The choice of technique should consider factors such as post-operative complications, recurrence rates, and the potential for complications such as bleeding and infection. Additionally, our findings provide insights into the prevalence of self-sucking in

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- different age groups of cows, emphasizing the need for targeted interventions based on the age of the animals.
- #### Conclusions
- In conclusion, the study confirms that surgical intervention is a reliable solution for treating self-sucking behavior in dairy cattle. Specifically, partial ventral glossectomy and partial full thickness glossectomy procedures demonstrated the highest success rates. The effectiveness of the surgical methods was found to be dependent on the invasiveness of the procedure and the extent of lingual tissue involved. Hence, the partial full thickness lateral glossectomy was identified as the most successful technique.
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