



Research Article

Surgical Affections in Cattle, Sheep and Goats Presented for Slaughter at Maiduguri Abattoir, North-Eastern Nigeria

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ABSTRACT

Abattoir surveys efficiently document livestock surgical conditions that might otherwise go unreported, particularly in resource-limited settings with limited veterinary surveillance. Despite the economic importance of cattle, sheep, and goats in north-eastern Nigeria, comprehensive abattoir data on surgical affections remain scarce. This study determined the occurrence and distribution of surgical affections in cattle, sheep, and goats slaughtered at Maiduguri Abattoir, Borno State, Nigeria. An observational, abattoir-based study was conducted over five months (April–August 2026) using a full-census approach, examining all animals for externally detectable surgical affections. Only active lesions meeting explicit case definitions, including wounds requiring surgical intervention, were recorded; healed scars and superficial abrasions were excluded. Data on species, sex, age (by dentition), and body condition scores were recorded for affected animals. Descriptive statistics summarized the data, with occurrence expressed as a percentage of the species-specific slaughter population. Of 38,818 animals slaughtered (9,675 cattle, 16,283 goats, 12,860 sheep), 44 bore surgical affections, giving an overall occurrence of 0.11% (0.15% cattle, 0.10% goats, 0.10% sheep). Wounds were most frequent (21 cases, 47.7%), followed by fractures (6, 13.6%), foot/horn and horn lesions (4 each, 9.1%), abscesses/swellings and hernias (3 each, 6.8%), and single cases of mastitis, ocular lesion, and myiasis (2.3% each). Among affected animals, 56.8% were male, 84.1% adults, and 50.0% in medium body condition. Surgical affections, predominantly wounds and fractures from trauma, occur in livestock slaughtered at Maiduguri Abattoir. These findings emphasize the need for improved animal handling and routine surgical condition recording during ante-mortem inspection.

Keywords: Abattoir survey; Animal Welfare; Cattle; Sheep; Surgical affections; Wounds

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INTRODUCTION

Cattle, sheep and goats are among the most widely kept domestic animals globally, valued for the meat, milk, skin and other by-products they supply. In many developing regions, including Nigeria, these three species together form the backbone of small-holder

and pastoral agriculture, and in the absence of well-developed rural banking systems, they also serve as a readily convertible store of wealth for the households that keep them (Food and Agriculture Organization of the United Nations [FAO], 2026). Nigeria's livestock population reflects this importance: the country is estimated to hold approximately 55 million cattle,

139 million goats and 65 million sheep, with the livestock subsector contributing around 21 percent of national agricultural gross domestic product (FAO, 2026).

In Nigeria, cattle, sheep and goats occupy a central place in the rural economy, and this importance is particularly pronounced in the northern part of the country, where a drier climate and extensive grazing lands favour large-scale ruminant husbandry (Iliyasu *et al.*, 2015). Borno State, and Maiduguri in particular, has long served as a major centre for the assembly and trade of cattle, sheep and goats moving from pastoral production areas in the north-east towards markets elsewhere in the country (Iliyasu *et al.*, 2015). Livestock in this zone are managed predominantly under extensive or agro-pastoral systems, characterised by communal grazing, long trekking distances to markets, and comparatively limited access to routine veterinary care (Buba *et al.*, 2020).

The term surgical affection describes conditions of the body that arise from, or are properly corrected by, surgical means, as distinct from conditions resolved through medical treatment alone (Farghali *et al.*, 2020). Such conditions may originate from external trauma, from infection that has progressed to the point of requiring incision and drainage, from abnormal tissue growth, or from developmental defects present from birth (Farghali *et al.*, 2020).

Wounds and abscesses are among the most frequently reported surgical affections of cattle, sheep and goats, arising from fighting, rough handling, and infection following minor injuries and routine procedures such as castration (Buba *et al.*, 2020). Fractures of the limb bones, most often the result of falls, road accidents or crush injuries sustained during transportation, are also regularly documented in hospital-based surgical case series (Bolaji-Alabi *et al.*, 2025; Shah *et al.*, 2024). Hernias, particularly umbilical hernias in young calves, similarly feature prominently among the surgical conditions reported in cattle (Torkaman *et al.*, 2025). Tumours and cysts, including ocular squamous cell carcinoma and *Cysticercus tenuicollis*, are further conditions regularly encountered in cattle, sheep and goats at slaughter (Fornazari *et al.*, 2017; Idowu *et al.*, 2024). Myiasis, the infestation of wounds and soiled tissue by fly larvae, and mastitis of the mammary gland complete a broad spectrum of surgical and surgically relevant conditions reported in Nigerian ruminants (Bolaji-Alabi *et al.*, 2025; Yoksa *et al.*, 2024).

The occurrence of many of these conditions is commonly examined in relation to the age, sex and body condition of the affected animal, since these host-related factors have repeatedly been shown to influence which animals within a population are affected (Mekuria *et al.*, 2013; Idowu *et al.*, 2024). Poor body condition, for example, has been shown to significantly increase the prevalence of *Cysticercus tenuicollis* in sheep, while age, but not sex, has been associated with the prevalence of the same condition in goats (Mekuria *et al.*, 2013; Idowu *et al.*, 2024). Parity has similarly been shown to influence the prevalence of subclinical mastitis in Sahel goats (Yoksa *et al.*, 2024), and young calves under fourteen weeks of age have been shown to account for the great majority of umbilical hernia cases, with no significant difference by sex (Torkaman *et al.*, 2025). Long treks on foot, overcrowding at markets and in lairages, and rough handling during loading and offloading have all been associated with an increased occurrence of wounds and other traumatic injuries in livestock presented for sale (Buba *et al.*, 2020). Procedures such as castration, where carried out under unhygienic conditions, may similarly predispose the animal to infection and abscess formation (Buba *et al.*, 2020). Prompt veterinary attention generally improves the outcome for the animal and limits the eventual cost to its owner, since a fresh wound is far more easily managed than one left to become infected or fly-blown (Bolaji-Alabi *et al.*, 2025).

Because large numbers of animals drawn from many different herds converge at a central abattoir within a short space of time, the abattoir offers an opportunity to observe and record conditions that might otherwise never come to the attention of a veterinarian (Ogunrinade *et al.*, 1981; Buba *et al.*, 2020).

Maiduguri Abattoir, as the principal slaughter facility serving Borno State's capital, receives cattle, sheep and goats from a broad catchment area within Nigeria and neighbouring countries, and slaughters a correspondingly large number of animals routinely (Iliyasu *et al.*, 2015).

Despite this, published, abattoir-based accounts of surgical affections specifically, covering the range of conditions from wounds and abscesses to fractures, hernias and ocular disease, remain uncommon for Maiduguri and much of north-eastern Nigeria (Bolaji-Alabi *et al.*, 2025). Existing local abattoir studies have tended to focus on individual conditions considered in isolation rather than on the surgical caseload as a whole, leaving comparatively little documented local

evidence on the general pattern of surgical conditions, and of the age, sex and body condition of the animals they affect, in this environment (Iliyasu *et al.*, 2015; Yoksa *et al.*, 2024). It is this gap that the present study sets out to address. Accordingly, the aim of this study was to determine the occurrence and distribution of surgical affections in cattle, sheep and goats presented for slaughter at Maiduguri Abattoir. The specific objectives were to identify the surgical affections observed in cattle, sheep and goats presented for slaughter at Maiduguri Abattoir, and to determine the distribution of these surgical affections according to species, sex, age and body condition.

Materials and Methods

Study Area

This study was conducted at Maiduguri Abattoir, Borno State, in the north-eastern, Sahelian zone of Nigeria. Maiduguri is the principal urban centre and livestock trading hub of Borno State, and the abattoir draws cattle, sheep and goats from a wide catchment area covering much of the state as well as neighbouring states and countries within the Lake Chad Basin. The facility slaughters a large number of animals on a routine basis, a scale that has previously made it a practical setting for systematic, abattoir-based veterinary research (Iliyasu *et al.*, 2015; Yoksa *et al.*, 2024).

Study Design and Duration

An observational, abattoir-based study design was employed to estimate the different types of surgical affections occurring in cattle, sheep and goats presented for slaughter. This design was considered appropriate because it allowed a defined population of animals to be examined for the presence of surgical affections, and for the demographic characteristics of affected and unaffected animals to be compared, within a practicable period of time. The study was conducted over a period of five months, from April to August 2026.

Study Population

The study population comprised all cattle, sheep and goats presented for slaughter at Maiduguri Abattoir during the study period. Rather than drawing a calculated sample, a full-census approach was adopted: records obtained from the Maiduguri Abattoir administration indicated that a total of 38,818 animals, comprising 9,675 cattle, 16,283 goats and 12,860 sheep, were presented for slaughter over the five-month study period. These monthly, species-specific totals served as the denominator population against which the occurrence of surgical affections was calculated. Every animal observed to bear a surgical affection during the study period was

individually examined, and its species, sex, age and body condition recorded.

Case Definitions and Inclusion Criteria

A surgical affection was defined, following Farghali *et al.* (2020), as a condition of the body that arises from, or is properly corrected by, surgical means, as distinct from conditions resolved through medical treatment alone. Because not every wound or skin lesion qualifies as a surgical affection, explicit operational criteria were applied at the point of examination. Only lesions that were present at the time of examination were recorded; healed scars, fully epithelialised lesions, and superficial injuries requiring only routine first-aid care were excluded.

The following case definitions were used:

Wound: an active breach of the skin or underlying tissue that required, or was likely to require, surgical intervention. This included full-thickness or deep wounds, lacerations, avulsions, necrotic or infected wounds, fly-blown (myiasitic) wounds, and wounds with significant tissue loss or exposed deeper structures. Superficial abrasions, grazes, and minor cuts that would heal with routine first aid alone were excluded. Healed scars and completely epithelialised lesions were excluded, as these are residua of past injury rather than surgical affections at presentation.

Fracture: clinical evidence of bone discontinuity, including abnormal mobility, crepitus, deformity, or inability to bear weight, with or without an accompanying open wound.

Foot/hof lesion: active disease of the foot or hoof requiring surgical attention, including foot rot, hoof overgrowth with lameness, sole abscess, and penetrating wounds of the sole or interdigital space.

Horn lesion: active injury or disease of the horn or horn base, including avulsion, fracture of the horn with haemorrhage, and necrosis or sepsis of the horn base.

Abscess or swelling: a circumscribed collection of pus or a discrete mass requiring incision and drainage, or surgical removal.

Hernia: a palpable defect in the abdominal wall with protrusion of abdominal contents, reducible or irreducible.

Mastitis: an inflamed, painful, or abscessated mammary gland requiring surgical drainage or surgical management.

Ocular lesion: an active lesion of the eye or adnexa requiring surgical attention, including ocular neoplasia, traumatic injury with haemorrhage, and corneal or periocular lesions.

Myiasis: active infestation of a wound or soiled tissue by fly larvae requiring surgical debridement.

Borderline lesions were resolved conservatively: where a lesion did not clearly meet the criteria for a surgical affection, it was not recorded.

Data Collection

Age was recorded and grouped only as young or adult. Sex, age, and body condition score were recorded only for animals found to bear a surgical affection; these variables were therefore not used to assess risk of affection, and the figures presented describe the affected animals only. Data were collected using a structured proforma designed to capture the species, sex, estimated age, and body condition score of each examined animal, with these variables recorded manually at the point of examination, together with the type, anatomical location, and gross description of any surgical affection observed (Mekuria *et al.*, 2013). Photographic documentation of grossly visible lesions was undertaken for each affected animal using a smartphone camera (Samsung Galaxy Z Fold 5) to support subsequent classification and description of the conditions encountered, following the general approach used in comparable Nigerian abattoir surveys (Idowu *et al.*, 2024).

Animal Examination

Each animal presented for slaughter was examined by visual observation and physical examination for externally detectable surgical affections, including wounds, abscesses, horn and ocular lesions, and gait abnormalities suggestive of fracture, hernia or foot disease (Farghali *et al.*, 2020). Sex was recorded by direct observation. Age was estimated from dentition, based on the number and wear of erupted permanent incisors, a method widely used for age estimation in cattle, sheep and goats where birth records are unavailable (Merck and Co., MSD Veterinary Manual). For animals found to bear a surgical affection, body condition was additionally scored on a standard three-point scale of poor, medium and good using the scheme described for sheep and goats by Mekuria *et al.* (2013) and the comparable condition-scoring scale developed for zebu cattle (Nicholson and Butterworth, 1986).

Data Analysis

Data were presented as frequencies and percentages in tables. The distribution of occurrence by sex, age, and body condition was also presented as percentages of the total animals with surgical affections, by species. Data collected were entered into Microsoft Excel and organised into frequency tables. Analysis was primarily descriptive, consisting of simple proportions and percentages: the occurrence of each surgical affection was expressed

as a percentage of the total number of cattle, sheep, or goats presented for slaughter within the study period, using the total population figures obtained from the Maiduguri Abattoir administration records as the denominator. The distribution of affected animals by sex, age, and body condition was similarly summarised and presented as percentages of the total number of animals found to bear a surgical affection, for each species separately.

RESULTS

This was a prospective observational (cross-sectional) study. Animals presented for slaughter at the Maiduguri Abattoir were examined during the five-month study period for the presence of surgical affections. To provide the denominator for occurrence estimates, retrospective slaughter records were obtained from the Maiduguri Abattoir administration. These records showed that a total of 38,818 cattle, sheep, and goats were presented for slaughter over the study period, comprising 9,675 cattle, 16,283 goats, and 12,860 sheep. The monthly distribution of these animals by species is presented in Table 1. The highest monthly slaughter figures were recorded in May (13,499 animals), while the lowest were recorded in August (4,448 animals). The use of abattoir records was limited to establishing the total number of animals slaughtered; all data on surgical affections were generated prospectively through direct examination of animals during the study period.

Of the 38,818 cattle, sheep and goats presented for slaughter during the study period, 44 were observed to bear a surgical affection, giving an overall occurrence of 0.11% (Table 2). Cattle had the highest within-species occurrence at 0.15% (15 of 9,675), followed by goats at 0.10% (17 of 16,283) and sheep at 0.10% (13 of 12,860).

Wounds were the most frequent affection, accounting for 21 of the 44 cases (47.7%): 9 in cattle, 7 in goats, and 5 in sheep, respectively. Fractures were the second most common affection, with 6 cases (13.6%): 4 in goats, 1 in cattle, and 1 in sheep, respectively. Foot/horn lesions and horn lesions each accounted for 4 cases (9.1%), respectively, while abscesses/swellings and hernias each accounted for 3 cases (6.8%), respectively. Single cases of mastitis, ocular lesion, and myiasis were recorded, each representing 2.3% of the total cases.

Of the 44 affected animals, 25 were males (56.8%), 18 were females (40.9%) and the sex of one animal (2.3%) was not recorded (Table 3). Males dominated among the affected cattle (10 of 15) and sheep (7 of

13), whereas females slightly outnumbered males among the affected goats (9 of 17). These figures describe the affected animals only. The sex of the unaffected animals was not recorded, so they do not show whether either sex is at greater risk.

Of the 44 affected animals, 37 (84.1%) were adults and 5 (11.4%) were young animals, and the age of two animals (4.5%) was not recorded (Table 4). All 15 affected cattle were adults; the young animals were four goats and one sheep.

Of the 44 affected animals, 22 (50.0%) were in medium body condition, 9 (20.5%) were in good condition and 2 (4.5%) were in poor condition, while body condition was not recorded for 11 animals (25.0%) (Table 5). Medium was the most common grade in cattle (7), goats (8) and sheep (7). Few of the affected animals were in poor condition, so the affections recorded were not confined to thin animals.

Table 1: Total Number of Cattle, Sheep and Goats Presented for Slaughter at Maiduguri Abattoir, April–August 2026

Month	Cattle	Goats	Sheep	Total
April	1,487	2,689	2,091	6,267
May	3,089	5,734	4,676	13,499
June	1,709	2,864	2,350	6,923
July	2,267	3,027	2,387	7,681
August	1,123	1,969	1,356	4,448
Total	9,675	16,283	12,860	38,818

Table 2: Occurrence of Surgical Affections in Cattle, Sheep and Goats Presented for Slaughter at Maiduguri Abattoir, April–August 2026

Surgical Affection	Cattle (n)	Goats (n)	Sheep (n)	Total (n)	Occurrence (%)
Wounds	9	7	5	21	0.054
Fractures	1	4	1	6	0.015
Foot/Hoof Lesions	1	1	2	4	0.010
Horn Lesions	2	1	1	4	0.010
Abscesses/Swellings	1	1	1	3	0.008
Hernias	0	0	3	3	0.008
Mastitis	0	1	0	1	0.003
Ocular Lesion	0	0	1	1	0.003
Myiasis	1	0	0	1	0.003
Total	15	17	13	44	0.113

Table 3: Distribution of Surgical Affections in Cattle, Sheep and Goats by Sex

Sex	Cattle (n)	Goats (n)	Sheep (n)	Total (n)	Percentage (%)
Male	10	8	7	25	56.8
Female	4	9	5	18	40.9
Not recorded	1	0	0	1	2.3
Total	15	17	13	44	100.0

Table 4: Distribution of Surgical Affections in Cattle, Sheep and Goats by Age Group

Age Group	Cattle (n)	Goats (n)	Sheep (n)	Total (n)	Percentage (%)
Young	0	4	1	5	11.4
Adult	15	12	10	37	84.1
Not recorded	0	1	1	2	4.5
Total	15	17	13	44	100.0

Table 5: Distribution of Surgical Affections in Cattle, Sheep and Goats by Body Condition Score

Body Condition	Cattle (n)	Goats (n)	Sheep (n)	Total (n)	Percentage (%)
Poor	0	1	1	2	4.5
Medium	7	8	7	22	50.0
Good	4	4	1	9	20.5
Not recorded	4	4	3	11	25.0
Total	15	17	13	44	100.0

The gross appearance of the surgical affections photographed during the study is shown in Plates 1 to 8. In each plate, the black arrow points to the site of the surgical affection, and the description is given beneath the photograph.



Plate 1: Chronic ulcerative wound on the lateral thoracic wall of an emaciated cow

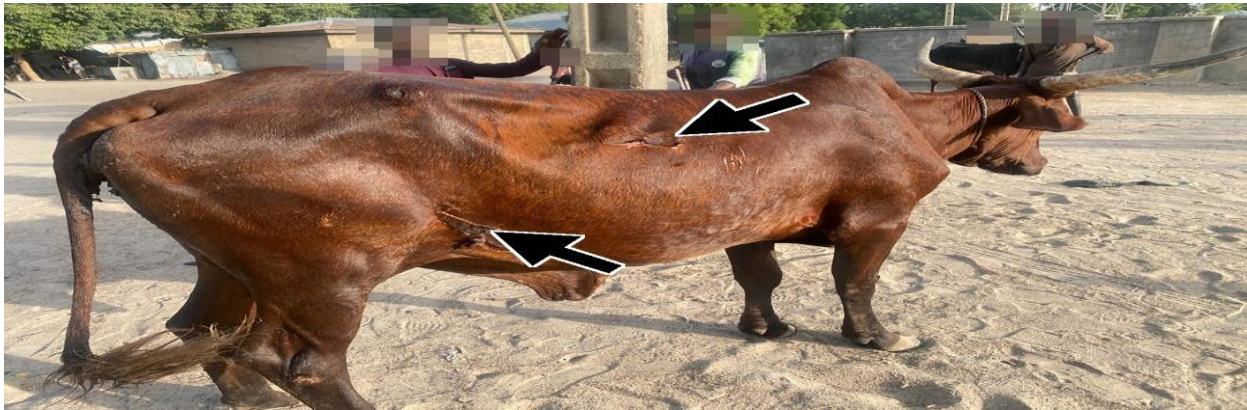


Plate 2: Lacerated wounds on the trunk and flank of a cow



Plate 3: Deep open wound over the carpus of a goat



Plate 4: Scabbed wounds on the lateral abdominal wall of a cow, with dried tissue protruding from one wound.



Plate 5: Extensive necrotic, crusted wound involving the horn base and orbit of a sheep



Plate 6: Suspected periocular squamous cell carcinoma with secondary myiasis in a cow



Plate 7: Fresh haemorrhage at the horn base of a goat (horn injury)



Plate 8: Traumatic injury to the horn, with haemorrhage, in a goat

DISCUSSION

Direct comparison with other work is difficult, because earlier studies in Maiduguri and elsewhere in Nigeria have examined single conditions or diseases, such as pregnancy wastage in cattle (Iliyasu *et al.*, 2015), mastitis in goats (Yoksa *et al.*, 2024) and cutaneous abscesses in slaughtered animals in Jos (Buba *et al.*, 2020), rather than surgical affections as a group. Occurrence was similar in the three species: 0.15% in cattle, 0.10% in goats and 0.10% in sheep. Cattle had the highest percentage, but the differences were small and the number of cases in each species was limited. Goats contributed the largest number of cases (17) only because far more goats than cattle were presented for slaughter.

Wounds were the most common affection, accounting for 21 of the 44 cases (47.7%), and they were the most common type in each of the three species. This predominance is consistent with injury to animals that are trekked, crowded, loaded and handled before slaughter, and wounds and abscesses are recognised among the common surgical affections of sheep and goats (Farghali *et al.*, 2020). The operational case definitions applied in this study restricted the wound category to active lesions requiring surgical intervention; healed scars and superficial abrasions were excluded, so the figure reflects active surgical wounds at presentation rather than all cutaneous breaches. This is an interpretation of the pattern, since the study did not examine the cause of each wound. Fractures were the second most common affection (6 cases, 13.6%), and four of the six occurred in goats. Fractures are a recognised reason for surgical presentation in small ruminants (Farooq *et al.*, 2024; Bolaji-Alabi *et al.*, 2025), and trauma, including falls, is a plausible cause, although the cause was not established here. Foot or hoof lesions and horn lesions (4 cases each, 9.1%), abscesses or swellings and hernias (3 cases each, 6.8%) were less frequent, and mastitis, an ocular lesion and myiasis occurred once each (2.3% each). All three hernias were in sheep, but the numbers are too small to draw any conclusion about species predilection.

Males accounted for 56.8% of the affected animals, adults for 84.1% and animals in medium body condition for 50.0%. These percentages describe the affected animals only. The sex, age and body condition of the unaffected animals were not recorded, so the figures do not show whether being male, adult or in a particular body condition increases the risk of a surgical affection. The small number of

affected animals in poor body condition (4.5%) suggests that the affections recorded were not confined to thin animals, although body condition was not recorded for 25.0% of the affected animals. The affections were graded visually by one observer. Animals were examined as they were presented at the abattoir. The study therefore recorded the affections present at the time of observation and could not determine whether affections occurred on the farm, during trekking or transport, or at the abattoir. Chronic conditions such as infected wounds with myiasis would have been present before the animals arrived, but fresh injuries could have arisen at any stage.

The most important limitations are that only externally visible affections were recorded, so the occurrence reported is likely to be an underestimate; that the classification of wounds as surgical affections depended on the judgement of a single observer applying the operational criteria defined in the Methods, with borderline lesions resolved conservatively; that sex, age and body condition were recorded only for affected animals, so risk factors could not be identified; and that age and body condition were only estimated. The findings should be read as a description of the surgical affections present at examination in animals presented for slaughter over five months in one abattoir.

CONCLUSION

Based on the findings of this study, the following conclusions are drawn: surgical affections occurred in 44 of the 38,818 cattle, sheep and goats presented for slaughter at Maiduguri Abattoir between April and August 2026, an overall occurrence of at least 0.11%. Occurrence was 0.15% in cattle, 0.10% in goats and 0.10% in sheep. Wounds were the most common surgical affection (21 cases, 47.7%) and were the most common affection in each of the three species. Fractures were the second most common (6 cases, 13.6%), occurring mostly in goats. Other affections recorded were foot or hoof lesions and horn lesions (4 cases each, 9.1%), abscesses or swellings and hernias (3 cases each, 6.8%), and single cases of mastitis, ocular lesion and myiasis (2.3% each). Most affected animals were male (56.8%), adult (84.1%) and in medium body condition (50.0%). These figures describe the affected animals only and do not identify risk factors. The predominance of wounds and fractures indicates that trauma is the main surgical problem in ruminants presented for slaughter at Maiduguri Abattoir. Because injuries were observed

in animals already presented for slaughter, the study could not establish where they occurred.

Abattoir management should improve animal handling at loading, offloading and in the holding pens to reduce wounds and other injuries. Owners and traders should treat wounds and fractures early and avoid overcrowding and rough handling during transport and trekking. Meat inspectors and veterinarians should record surgical affections routinely at ante-mortem inspection so that the burden of these conditions can be monitored over time. Further studies incorporating post-mortem examination and detailed histories of animal movement should be conducted to establish the timing and causes of surgical affections in this population.

Conflict of Interest

The authors declare no conflict of interest.

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