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STUDY OF LOCAL MANIFESTATIONS OF SNAKE BITE AND ITS SURGICAL IMPLICATIONS IN MANAGEMENT IN TERTIARY CENTER IN INDIA

General Surgery

Dr. Ujjaval Kadiya* Senior resident, department of general surgery, PDU medical college, Rajkot. *Corresponding Author

Dr. Ajay Rajyaguru Associate professor, department of general surgery, PDU medical college, Rajkot.

ABSTRACT

Background: Manifestations of snakebite have local and systemic implications. While systemic manifestations can be life-threatening, local complications like cellulitis, necrosis, and compartment syndrome secondary to snakebite can threaten limb survival. This study undertakes the recognition of local complications and its outcome. **Methods:** A prospective observational study was conducted at our tertiary center in India. 50 snake bitten patients presenting in between September 2020 to September 2022 were studied. Surgical interventions whenever required for managing local surgical complications were recorded and analyzed. **Results:** Out of 50 patients, majority of patients were below 45 years of age with male (56%) predominance, with lower limb (61%) as most common site with 70% patients were bitten by neurotoxic snakes and 14 % patients by haematotoxic snakes requiring systemic therapy. Majority of patients (52%) having grade 3 severity of envenomation. Out of 50 patients, 46 (92 %) had local signs of inflammation, necrotic changes in 12 (24%), compartment syndrome in 3 (6%), 37 (74%) patients were treated conservatively while 13 (26%) had to undergo surgical interventions. In total no. of surgical interventions 84.61% required debridement and 15.39% required fasciotomy. Those undergoing surgical interventions had longer hospital stays (mean=10.92) as compared to those treated conservatively (mean=4.59). **Conclusions:** Local manifestations of most snake bites can be well managed conservatively. Careful observation for surgical emergencies and when required immediate proper surgical intervention required preventing loss of limb or loss of life.

KEYWORDS

Surgical implications, Snakebite, Surgical interventions

INTRODUCTION

Snake bite is a major public health problem throughout the world, more so in tropical and subtropical countries. There are thousands of snake species, but only 15% are considered dangerous to humans.[1] The world population of snakes is comprised of about 2800 species of which only 375 species are known to be poisonous.[3] The vast and diversified habitat terrains in India are inhabited by about 236 species of which only 52 are poisonous or harmful and the deadliest species are referred to 4 groups only viz., Cobra, Krait, Viper and Coral.[4] It is estimated that globally 5 million snakebite cases occur annually resulting in about 1,25,000 deaths. More than 2,00,000 cases of snakebites are reported in India each year out of which 35,000-50,000 turn out be fatal, the most snakebite deaths for any country.[2] Hence, snakebite is emerging as a serious public health problem in India. Snakebites can be a serious surgical emergency, sometimes life-threatening, requiring swift diagnosis followed by appropriate treatment.[3] Limbs, especially the lower limbs are common sites of snake bites. Snakebite has a varied spectrum of signs and symptoms ranging from none at all to immediate burning pain followed by swelling, pigmentation, necrosis, and other inflammatory signs at the local site, which may even progress to systemic symptoms. Systemic complication of snake bite like hematological manifestation like hematuria, gum bleeding, epistaxis, hematemesis, neurological manifestation like ptosis, blurring of vision, diplopia, dysphagia, acute renal failure, circulatory collapse and shock, respiratory failure due to neuroparalytic snake bite, intracerebral hemorrhage may occur.[5] Local complications like cellulitis, necrosis, and compartment syndrome secondary to snake bite can threaten limb survival even after control of systemic manifestations.[6] Combined vessel entrapment and compartment syndromes due to snakebite warrant urgent surgery once hypovolemia and coagulopathy have been controlled. [7-8]

METHODS

This is a prospective observational study in which 50 patients of all age groups and both genders presenting withsnakebite in various wards at P.D.U. government civil hospital, Rajkot, Gujarat, India, in between September 2020 and September 2022, were studied. All patients with confirmed snake bite were included in this study. Clinical profile of the patients, time from the bite to hospital, all symptoms and signs of local complications of snakebite like cellulitis, tissue necrosis, gangrene, and surgical management including debridement, fasciotomy; skin grafting and secondary healing were recorded. The patients were managed with appropriate systemic therapy including ASV, tetanus prophylaxis, antibiotics, limb elevation, glycerine magnesium sulfate dressing, and critical care support as and when required. Mean, median, mode were calculated where required. The patients were excluded which fall in the category of the unknown bite or unconfirmed/suspicious snakebite. This study is approved by the institutional ethics committee.

RESULTS

The data from September 2020 to September 2022 were analyzed. 50 patients, with a diagnosis of snakebite, were studied of which 28 (56%) male and 22 (44%) female were admitted (Figure 1) with average age of 26 years.

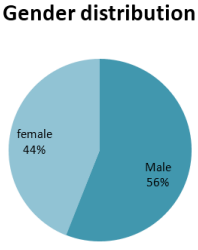

Figure 1: Gender representation of snakebite patients under study.

Table 1 show that out of 50 patients, 42 (84%) were bites from venomous snakes and required systemic therapy (anti-snake venom). While the rest were non-venomous (8) and of the bites from venomous snakes, 35 (70%) had neurotoxin venom and 7 (14%) had haematotoxin venom. Non-venomous snakes are more frequently encountered and may not require antivenom treatment but may end up with surgical implications.

Table 1: Type of snakes

Type of snakes	Number of patients (%)
Non venomous	8 (16)
Neurotoxic	35 (70)
haematotoxic	7 (14)

Table 2 shows that majority of the patients (61%) had snake bite over lower limb and 37% patient had bite over upper limb and 2% patient had bite at sites other than limbs. this is mainly due to bare foot work done by farmer on field.

Table 2: Incidence of snake bite with reference to site of bite

Site of snake bite	Percentage
Lower limb	61
Upper limb	37
Other	2

Table 3 shows that pain was present in all patients, while bleeding from the site was present in 03 (06%) of the patients. 46(92%) patients had local signs and symptoms of cellulitis, 12 (24%) patients had sign of necrosis and 03 (06%) patients had compartment syndrome. It suggests that though systemic effects of the venom can be life-threatening, local manifestations like cellulitis, ischemic changes, and compartment syndrome can lead to high morbidity.[11]

Table 3: Clinical manifestations in snake bite patients.

CLINICAL MANIFESTATIONS	NUMBER OF PATIENTS (%)
Pain	50 (100)
Bleeding	03 (06)
Cellulitis	46 (92)
Necrosis	12 (24)
Compartment syndrome	03 (06)

Table 4 shows that majority of the patients had grade 3 severity of local manifestation i.e., final local swelling of 1 to 4 cm with no necrosis. 13 cases (25.49%) patients had severe local manifestation with necrosis. As evident from the graph above, as the grade of edema increased, so did the requirement of surgical intervention

Table 4: Grade of Severity of Envenomation:

Grading	Number	Surgery required
1	3	0
2	4	0
3	26	1
4	4	2
5	13	11

Table 5 shows 37 (74%) patients were treated conservatively while 13 (26%) of the patients required surgical intervention/s and it compares the length of hospital stay in patients treated conservatively and those by surgical intervention. The duration of hospital stays of patients who had surgical intervention is higher as compared to those who were treated conservatively ($p = 0.02$). Even though many of them would have recovered from the systemic complications of the snake venom, they still had higher morbidity and prolonged hospital stay resulting in an increased financial burden on the patients.

Table 5: Surgical intervention and the length of hospital stay.

Management	Number (%)	Average length of hospital stay
Conservative	37 (74)	4.59
Surgical	13 (26)	10.92

Table 6 shows the surgical interventions done in patients. Fasciotomy was done in 18.26% of the patient and debridement in 15.07% of the patients.

Table 6: Types of surgical interventions.

SURGICAL INTERVENTION	NUMBER (%)
Debridement	11 (22)
Fasciotomy	03 (06)
Secondary healing after dressing	10 (20)
Skin grafting	03 (06)

DISCUSSION

In India, there are 2000 species of snakes of which 52 are poisonous.[3] Most of the patients would be from rural areas and work on farms barefooted, hence making them more susceptible to bites.

The morbidity and mortality also depend on how early the first aid was given to the patient and the initiation of the systemic therapy in the form of anti-snake venom, tetanusprophylaxis, critical care support, and surgical management.

The time elapsed between the bite and the start of the treatment has been an important factor. In India, patients tend to reach the hospital late as they reside in far-flung rural areas with difficult transport facilities; also they are initially ignorant to seek medical care and visit.

Early administration of ASV reduces morbidity and mortality and the incidence of local surgical complications. [13] In our study total 26% of patients had surgical intervention, which would suggest higher morbidity/mortality in the patients and longer hospitalstay.

Snakebites are likely to develop local complications leading to cellulitis, tissue necrosis, slough, and compartment syndrome. [1] The decision on debridement should not be delayed. In our study 22% of patients required debridement whereas, in literature, it ranges from 0.05% to 38%.[3] some even suggest prophylactic debridement (in absence of local necrosis) to limit local envenomation.[4]

The most dreaded complication would be compartment syndrome where early fasciotomy would help in salvaging the limb.[14] In our study, 03 (06%) patients developed compartment syndrome and required fasciotomy (06%). Debridement followed by wound regular dressing along with antibiotic administration seems to be a mainstay treatment in such cases. [9,10] The patients were subsequently treated with secondary healing 10 (20%), skin grafting 03(06%).

In our study, those who had signs of local inflammation 46 (92%), 13 (26%) required surgical intervention, hence the presence of local signs and symptoms should warn us of impending surgical complications requiring further intervention.

The average hospital stay in other studies was 6.24 days and in our study 10.92 days in those requiring surgical intervention and 4.59 days for those treatedconservatively. This suggests a statistically significant ($p = 0.02$) difference between the hospital stay duration of those treated conservatively and those requiring surgical intervention. The unique objective of this study is to focus on the importance of surgical interventions in the treatment of snakebites, which is usually ignored primarily. Very few studies in the literature have documented its significance.

Limitations of this study is smaller sample size and limited population. Large sample size can be more useful for accurate incidence of various surgical complications andby that helpful for better management plan.

CONCLUSION

Our study suggested that local manifestations of most snake bites can be well managed conservatively with general measures and systemic ASV therapy, antibiotics and edema measures. Surgery plays an important role in the management of snakebite patients, especially in those patients with an exaggerated local response. Careful observation for compartment syndrome, necrotizing fasciitis and gangrene and when required immediate proper surgical intervention required preventing loss of limb or loss of life.

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