

NECROTIZING SOFT TISSUE INFECTIONS MANAGEMENT

**- A STUDY ABOUT THE INTERVENTION WITH
LONG INCISION FASCIOTOMIES OVER OTHER
TYPES OF TRADITIONAL MANAGEMENT**

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CHENNAI, TAMILNADU.**

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CERTIFICATE

This is certify that this dissertation titled “**NECROTIZING SOFT TISSUE INFECTIONS MANAGEMENT - A STUDY ABOUT THE ADVANTAGES OF LONG INCISION FASCIOTOMIES OVER OTHER TYPES OF TRADITIONAL MANAGEMENT**” has been prepared by Dr.R.Senthil Raghavan under my supervision in the Department of General Surgery, Chengalpattu Medical College, Chengalpattu during the academic period 2008-2011 and is being submitted to the Tamilnadu Dr M.G.R. Medical University, Chennai, in partial fullfillment of the university regulation for the award of the degree of **Master of Surgery (M. S. General Surgery)** and his dissertation is a bonafide work.

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INDEX

S.NO	CONTENTS	PAGE NO
1.	INTRODUCTION	1
2.	OBJECTIVE OF STUDY	3
3.	REVIEW OF LITERATURE	4
4.	MICROBIOLOGY	16
5.	MATERIALS AND METHODS	17
6.	ANALYTICAL CHARTS AND DATA ANALYSIS	19
7.	DISCUSSION	29
8.	SUMMARY AND CONCLUSION	34
9.	PROFORMA	37
10.	BIBLIOGRAPHY	41
11.	CASE STUDY PICTURES	
12.	MASTER CHARTS	

NECROTIZING SOFT TISSUE INFECTIONS MANAGEMENT

A STUDY ABOUT THE ADVANTAGES OF LONG INCISION FASCIOTOMIES OVER OTHER TYPES OF MANAGEMENT

INTRODUCTION

Necrotizing Soft Tissue Infections (NSTI'S) comprise a spectrum of disease entities that are characterized by extensive rapidly progressive soft tissue necrosis that usually involves the muscular fascia and subcutaneous tissue, but can also affect skin & muscle. NSTI'S classified as cellulitis, fasciitis or myositis, based on the principle soft tissue layer involved with necrosis. These infections can have either an indolent or fulminant presentation and their clinical course is unpredictable.

In our hospital NSTI'S are relatively not uncommon, are presented acutely in outpatient Dept. & Casualty. The spectrum of this disease is usually underestimated & surgical intervention delayed for a considerable time.

Although the mortality is very high, (53 to 73%) in other studies conducted, in our hospital the mortality was low compared to other studies conducted. While the morbidity is high as in other studies.

In majority of cases, it was associated with comorbid conditions like DM, malnutrition, obesity, peripheral vascular diseases & other systemic illnesses. NSTI'S are commonly affects older age group & the average age is (53 %) & affects upper or lower limbs, perineal region, more commonly.

Early diagnosis & early surgical intervention is needed in NSTI'S, but the diagnosis is usually delayed & the recovery time & recurrence is high in delayed cases.

The best outcome depends upon the decompression of the affected area & vascular recovery.

There is no clear cut pattern of debridement or decompression explained because it depends upon the affected site. Here we observed the various modality of debridement in different surgical units & found out the outcome.

The single long incision with minimal excision of affected tissues or no excision had the good outcome & quick recovery from Septicemia, in observed cases. The disfigurement of the affected area is a disadvantage, but can be managed by allowing healing by secondary intention, or secondary suturing or skin grafting.

OBJECTIVE OF STUDY

To study the advantage of decompression by single long incision fasciotomies with over other types of traditional management in the cases of Necrotizing soft tissue infections.

REVIEW OF LITERATURE

Definition

Necrotizing soft tissue infections, a relatively rare entity, is characterized by rapidly progressing necrosis of the fascia and subcutaneous fat with subsequent necrosis of overlying skin, muscle involvement in minimal or nonexistent.

Classification

Necrotizing soft tissue infections (NSTI'S) comprise a spectrum of disease entities that are characterized by extensive rapidly progressive soft tissue necrosis that usually involves the muscle fascia and subcutaneous tissue but can also affect the skin and muscle. NSTI'S are classified as,

- Cellulitis
- Fasciitis
- Myositis

Based on the principle soft tissue layer involved in necrosis. These infections can have either an indolent or culminant presentation and their clinical course is unpredictable.

Microbiologists separate NSTI'S in to two types:

TYPE: I

Is most commonly associated with sub acute infection and with the NSTI'S occurring as a secondary entity to an existing infection? Usually at least one anaerobic species, such as Bacteroides, or Enterococcus, is present and may be isolated in combination with one or more microbes such as non Group A streptococci, Escherichia coli, Klebsiella or proteus. The anaerobes and aerobes work in synergy to overwhelm the host's immune defense.

TYPE: II

Is usually suspected when acute and culminant infection is identified. Such cases are often idiopathic and there may be no apparent point of entry for the organisms. Group A streptococci either alone or combination with staphylococcus aureus in a common finding. This infection has an extremely rapid course and is most likely to involve the extremities

CLASSIFICATION ON CLINICAL PRESENTATION

Hyper acute and sub acute variety of necrotizing fasciitis are increasingly reported in the literature.

HYPER ACUTE NSTI'S

The hyper acute variant presents with an extremely culminant course with extensive undermining of surrounding tissue, severe septicemia and multiorgan failure within 24 hrs of the inciting event. Patients are often over 50 yrs and age and have underlying co morbidities particularly chronic liver diseases and Diabetes mellitus. Because of rapidity of the process, there is minimal time for specific cutaneous signs to develop and skin looks deceptively normal. The true

extent of the infection appreciated only at operation. Shock and multi organ derangement is a feature and is a crucial diagnostic clue of hyper acute necrotizing fasciitis. Early diagnosis, extensive debridement and in extreme cases willingness to amputate at a very early stage may be the only intervention that can save the lives of patients. Otherwise the disease has an almost 100% mortality.

SUBACUTE NSTI'S

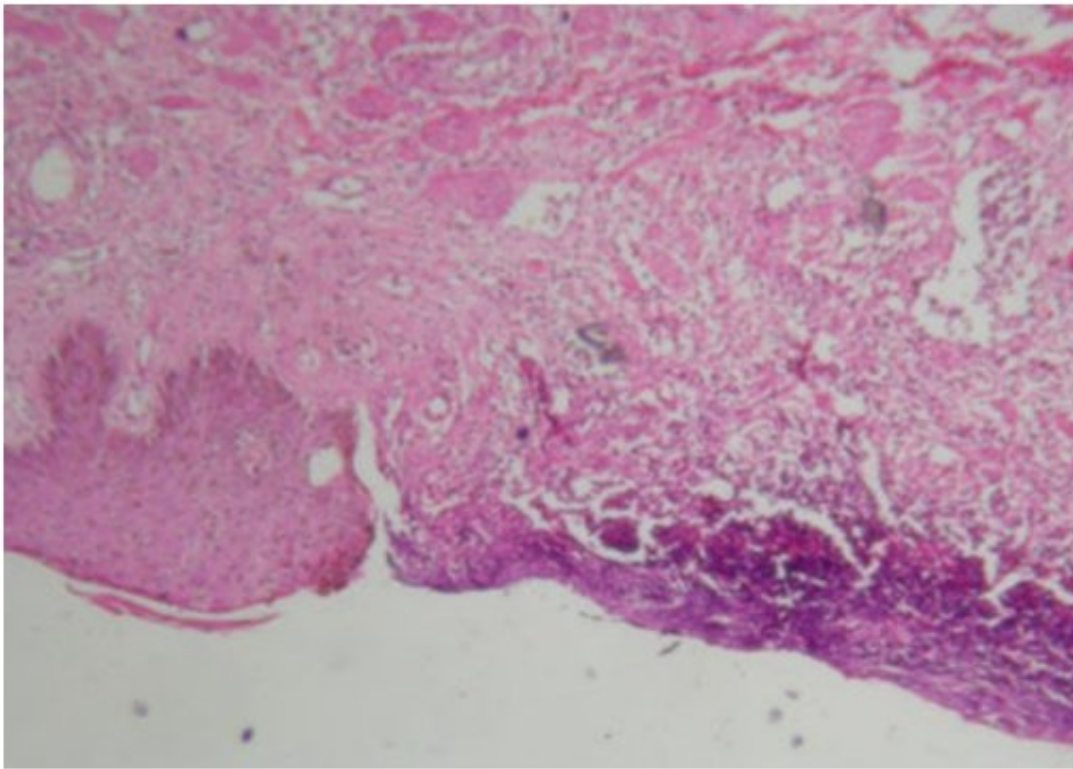
In contrast to hyper acute type, sub acute NSTI'S runs a more indolent course. Patients often complain of areas of festering soft tissue infection with minimal pain and discomfort. This can fester on for weeks to months. Sudden deterioration is however commonly seen and if not treated by early aggressive surgical debridement is associated with high mortality. This departure of clinical presentation from the classical NSTI'S makes clinical recognition of sub acute from hyper acute is very difficult.

PATHOPHYSIOLOGY AND CLINICAL PRESENTATION OF N I S T 'S

The initiating event is an insult to soft tissue or may be idiopathic. The primary site of pathology is in the superficial fascia. Bacteria proliferate within the superficial fascia and elaborate enzymes and toxins enable the organisms to spread through the fascia. The precise mechanism of spread has not been fully elucidated but some investigators have attributed it to expression of bacterial enzymes such as hyaluronidase, which degrades the fascia.

The key pathological process resulting from this uncontrolled proliferation of bacteria is angio-thrombotic microbial invasion and liquifactive necrosis of the superficial fascia. Histologically, necrosis of the superficial fascia, polymorphonuclear leucocytes infiltration of the deep dermis and fascia, thrombosis and suppuration of veins and arteries coursing through the fascia, and micro organism proliferation within the destroyed fascia are seen. As this process progresses occlusion of perforating nutrient vessels to the skin causes progressive skin ischemia. This is the underlying event that is responsible for the cutaneous manifestation of NSTI'S as the disease evolves. Initially a horizontal phase predominates with rapid spread through the fascia with extensive undermining of the apparently normal looking skin. As the condition evolves ischemic necrosis of the skin ensues with gangrene of the subcutaneous fat, dermis & epidermis manifesting progressively as bullae formation, ulceration & skin necrosis

- Organisms spread from the subcutaneous tissue along the superficial and deep fascial planes, facilitated by bacterial enzymes and toxins. This deep infection causes vascular occlusion, ischemia, and tissue necrosis. Superficial nerves are damaged, producing the characteristic localized anesthesia. Septicemia ensues with systemic toxicity.
- Bacterial factors M-1 and M-3 surface proteins increase the adherence of the streptococci to the tissues and protect the bacteria against phagocytosis by neutrophils.
- Streptococcal pyrogenic exotoxins (SPEs) A, B, C are directly toxic and tend to be produced by strains causing NF. These exotoxins, together with streptococcal superantigen (SSA), lead to release of cytokines and produce clinical signs such as hypotension. The poor prognosis in NF has been linked to infection with certain strep strains. (Schwartz 2009)
- Facultative aerobic organisms grow since polymorphonuclear (PMN) leukocytes exhibit decreased function under hypoxic wound conditions. This growth further lowers the oxidation/reduction potential, enabling more anaerobic proliferation and, thus, accelerating the disease process. Carbon dioxide and water are the end products of aerobic metabolism. Hydrogen, nitrogen, hydrogen sulfide, and methane are produced from the combination of aerobic and anaerobic bacteria in a soft tissue infection. These gases, except carbon dioxide, accumulate in tissues because of reduced water solubility. (Maynor 2004)



Photomicrograph showing presence of ulcerated epidermis. The dermis shows presence of thrombosed blood vessel and bacterial colonies (H&E, X200).

THE CLINICAL PRESENTATION

Skin ischemia is the underlying process that explains these progressive changes seen clinically

STAGE – I (Early)	STAGE – 2 Intermediate	STAGE – 3 Late
1. Tenderness to palpation (extending beyond the apparent area of skin involvement). Erythema Swelling Warm to palpation (Focal temperature)	Blister or bullae formation (serous fluid) skin fluctuance skin indurations	Hemorrhagic bullae Skin anesthesia Crepitus Skin necrosis with dusky discoloration progressing to frank gangrene.

It is generally accepted that early on the evolution of necrotizing tissue infections, the disease is clinically indistinguishable from severe soft tissue (Stage 1) infection such as cellulitis and erysipelas presenting with only pain tenderness and warm skin.

In NSTI'S, margins of tissue involvement are often poorly defined with tenderness extending beyond the apparent area of involvement. Lymphangitis is rarely seen in necrotizing fasciitis. Blister & bullae formation is an important diagnostic clue. When present it signals the outset of critical skin ischemia (stage –2) blisters are caused by ischemia induced necrosis as the vessels coursing through the fascia to supply the skin are progressively thrombosed by the invading organisms. Blistering or bullae formation is rarely seen in erysipelas or cellulites and should raise the suspicion of necrotizing soft tissue infection. The late stage (stage 3) signal the onset of soft tissue necrosis and is

characterized by the so called “hard signs” of NSTI’S such as hemorrhagic bullae, skin anesthesia and frank skin gangrene. Clinical staging is important to better define disease progression and to heighten the awareness during serial evaluation of soft tissue infections. Other systemic manifestations of NSTI’S are high fever, hypotension, prostration and multiorgan failure.

Diagnosis

Diagnosis is mainly based on clinical & operative findings. The operative findings in NSTI’S include the presence of grayish necrotic fascia, demonstration of lack of resistance of normally adherent superficial fascia to blunt dissection, lack of bleeding of the fascia during dissection and the presence of foul smelling “dishwater” pus. Tissue specimens for culture and histology are crucial and should be performed for all patients without exception. Culture guided appropriate anti microbial selection and histology give a confirmation of diagnosis. These specimens should be generous and taken from the margins of involvement of the fasciitis apparently normal fascia, to ensure a good heal. Specimens sent for anaerobic, aerobic & fungal culture study.

Histological criteria for diagnosis necrotizing fasciitis as described by Stamenkovic & Lew reliably identified even early cases of necrotizing soft tissue infections. The histological criteria for diagnosis were necrosis of the superficial fascia Polymorphonuclear infiltration of the dermis and fascia, fibrinous thrombi of arteries and veins coursing through the fascia angitis with fibrinoid necrosis of arterial and venous walls, presence of micro organisms within the destroyed fascia and dermis and an absence of muscle involvement, Histology is important particularly in cases for which the operative findings are

equivocal for early necrotizing fasciitis, as it determines the need for an early second look and repeat debridement.

Diagnostic adjuncts for NSTI'S

Finger Test: performed under local anesthesia. A – 2cm incision down to the deep fascia is made probing of the level of the superficial fascia is then performed. The lack of bleeding, foul smelling dishwater pus and minimal tissue resistance to finger dissection constitute a positive finger test, which is diagnostic of necrotizing fasciitis.

X-Rays

The presence of gas in tissue by plain radiograph more sensitive than clinical examination

C T

Features reported to be indicative of clinical examination NSTI'S on CT scan include deep fascial thickening, enhancement fluid and gas in the soft tissue planes in and around the superficial fascia.

USG

On ultra sound suggestive features are thickening and distortion of the deep fascia and fluid collections along the deep fascia.

MRI

Deep fascial thickening, deep fascial fluid collections and hyper intense T2W signal within the muscles.

Frozen section biopsy

Done on table, 1cm of piece of tissue specimen from suspected area for immediate examination. Positive cases are subjected to immediate surgical debridement.

Near infrared spectrography

Used to determine oxygen tissue saturation. At a cutoff tissue oxygen saturation of less than 70% .This test to have a sensitivity of 100% and specificity of 97%.

THE BIOCHEMICAL PARAMETERS

LRINEC (Laboratory Risk Indicator for Necrotizing fasciitis) Scoring is used in evaluation of NSTI'S. This includes WBC count, CRP, Hemoglobin, Sodium, and Creatinine & Glucose.

Variable	Score
C-reactive protein (mg/e) <150mg/L	0
>150 mg/L	4
Total white cell count (per mm ³)	
<15	0
15-25	1
>25	2
Hemoglobin (g/dL)	
>13.5	0
11-13.5	1
<11	2
Sodium (mmol/L)	
135 or >	0
<155	2
Creatinine (mg/dL)	
≤ 1.6	0
> 1.6	2
Glucose level mg/dL	
≤ 180	0
> 180	1

At a cut off of a LRINEC score of 6 or greater the model has a positive predictive value of 92% and negative predictive value of 96%. A score of 8 or more strongly predictive of necrotizing fasciitis (positive predictive value 93.4)

OUTCOME

Various modality of management influence the spectrum of recovery.

The type of management was depended upon the units of general Surgery in our hospital. ,Multiple stab & small incisions , single long fasciotamies, vigerous debridment by excision of necrosed tissue, secondary suturing, S S G for elective cases are the various type of management.

The time taken for the pts who are managed by single long incision

Recovered within 3 weeks.where multiple stab & small incisions took more than 5 weeks. Snake bite cases show faster recovery with long incision fasciitomes, because the age group and the part invovled ,& the organism caused. Snake bite cases 80% of them healed by secondary suturing where Others are failed.

S S G done for failed cases of secondary suturing & those who got vigourous debridement.

Below knee amputation done for two cases due to their late presentation & comorbid illnesses. 3 cases are died due to late presentation.

MICROBIOLOGY

The most common organism encountered in necrotizing fasciitis is *Escherichia coli* along with *proteus* species. Mixed infection is seen in 33% of patients, & most common mutualism seen among *proteus mirabilis* with *klebsiella oxytoca*.

Citrobactor species & *enterobactor* species are common among the snake bite cases. 3 patients died & their culture result were *proteus* species.

AMONG 39 PATIENTS

E.COLI	-	4 CASES
KLEBCIELLA SPECIES	-	11 CASES
PROTEUS SPECIES	-	10 CASES
COAGULASE –VE STAPHYLO COCCUS	-	6 CASES.
ENTEROBACTOR SPECIES	-	3 CASES
CITROBACTOR SPECIES	-	5 CASES
PROVIDENCIA SPECIES	-	1 CASE

MATERIALS & METHODS

PATIENTS & METHODS

This was a descriptive study conducted at Chengalpattu Medical College, Dept. of General Surgery in unit IV. The wards are 9 & 10, & septic ward over a period of one & half years June 2009 to December 2011. This includes the patients diagnosed as cellulitis, necrotizing fasciitis and admitted through surgical OP & Casualty. The patients below 12 years of age, localized abscesses, intra abdominal solid organs involvement, secondary surgical wound infections and Diabetic foot were excluded from the study.

After resuscitation in Casualty reception the patients underwent wound debridement where pus was collected for culture & sensitivity test. Septic OT used in all of the cases. In selected cases single or multiple long incisions done. In few cases all necrosed material and slough was removed. Wound was irrigated with Hydrogen peroxide & Normal saline. The post debridement management included correction of fluid and electrolyte balance coagulation profile, intravenous antibiotics, daily dressings & nutritional supplementation. Antibiotics were changed later according to the culture sensitivity results. The patients were kept in isolated septic ward. Few patients had “Matthan thylam” application which was useful in wound granulation & deodorization.

Few of them got opinion from plastic surgery department and received SSG. Later the patients followed up to a possible time intervals. Data was connected with special reference to demographics, clinical features, investigations, co morbidities, involved site, surgical intervention, outcome & follow up.

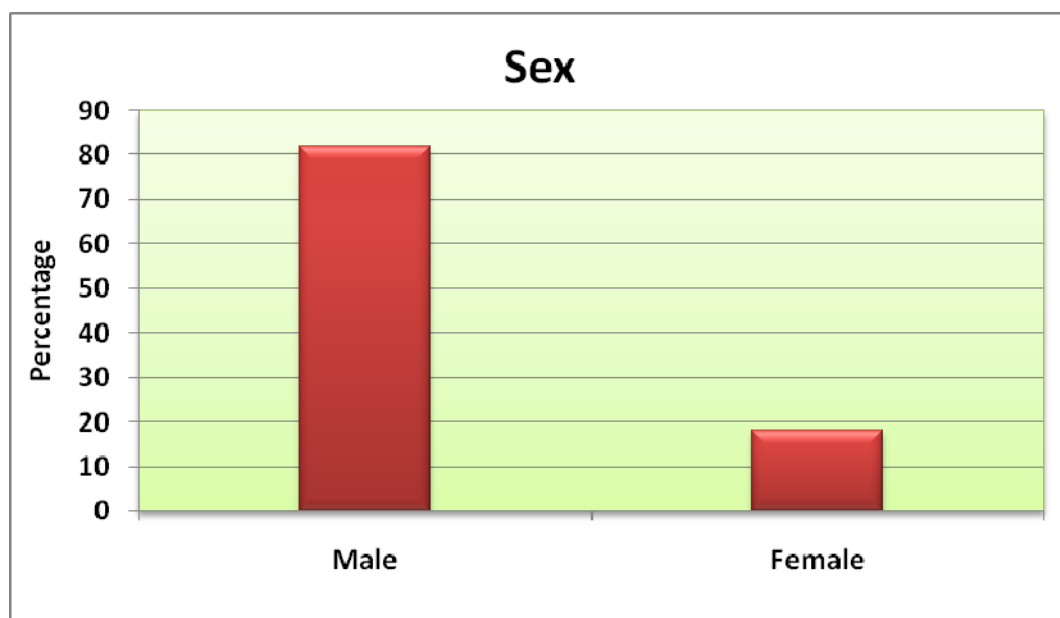
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ANALYTICAL CHARTS & DATA ANALYSIS

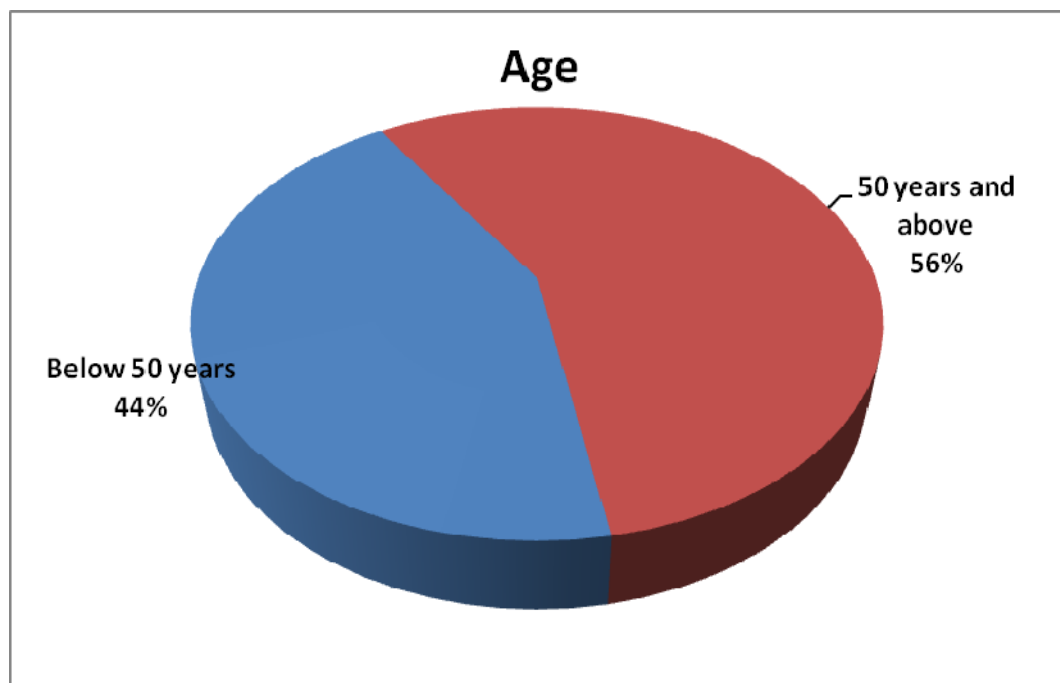
SEX DISTRIBUTION OF PATIENTS

Sex	Frequency	Percent
Female	7	17.9
Male	32	82.1
Total	39	100.0



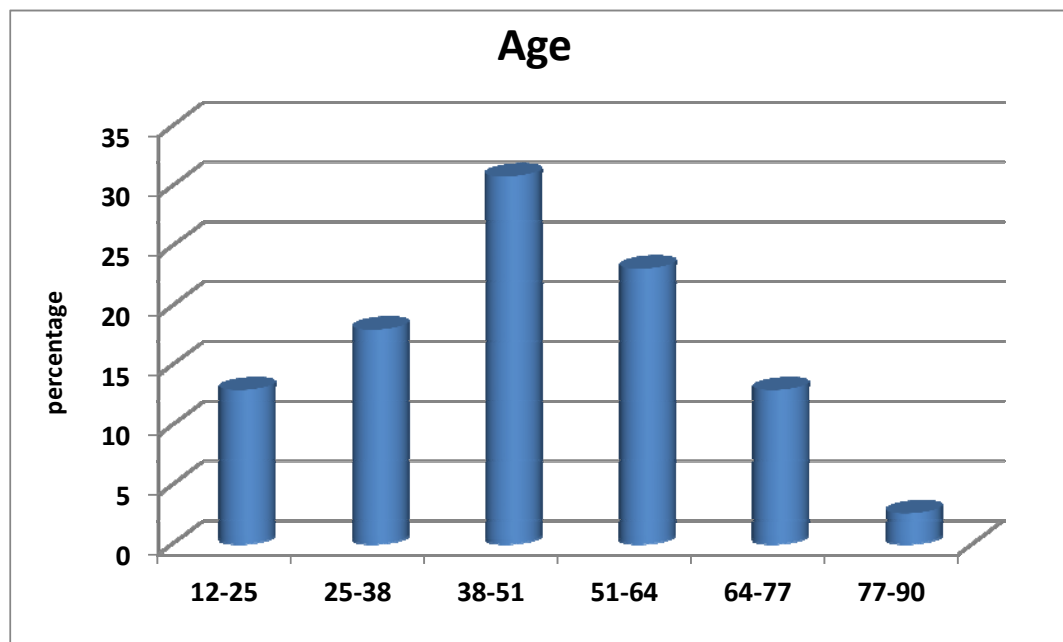
AGE DISTRIBUTION OF PATIENTS

Age	Frequency	Percent
Below 50 years	17	44
50 years and above	22	56
Total	39	100



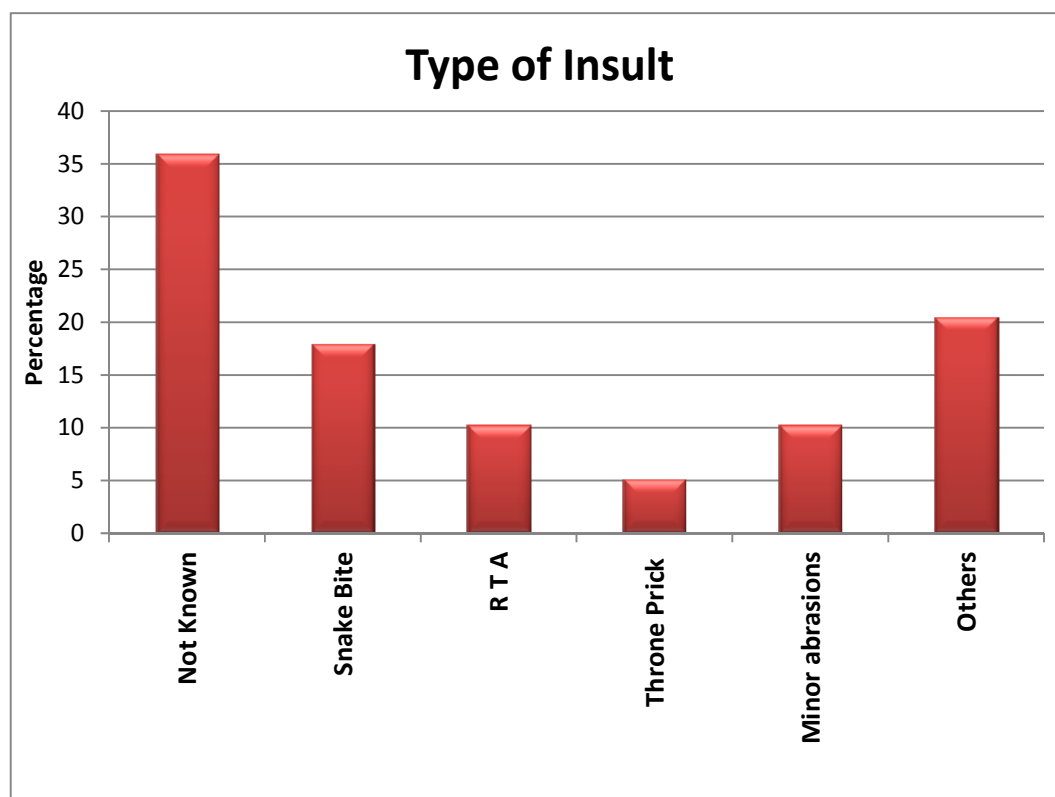
AGE GROUP DISTRIBUTION OF PATIENTS

Age	No.of cases	Percentage
12-25	5	13
25-38	7	18
38-51	12	31
51-64	9	23
64-77	5	13
77-90	1	3
Total	39	100



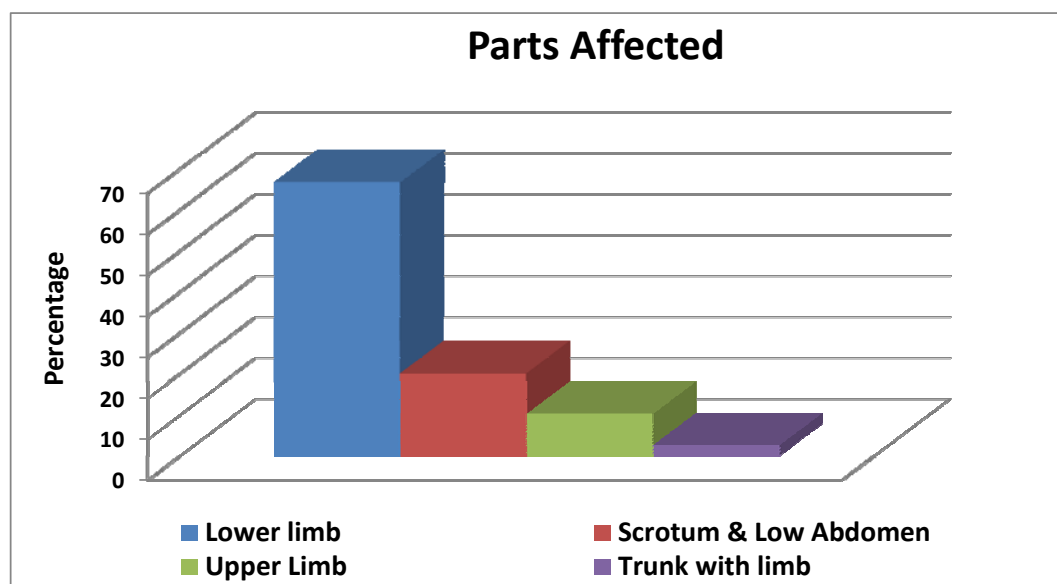
TYPE OF INSULT

Type of Insult	No of Cases	Percent
Not Known	14	36
Snake Bite	7	18
R T A	4	10
Throne Prick	2	5
Minor abrasions	4	10
Others	8	21
Total	39	100



PARTS AFFECTED

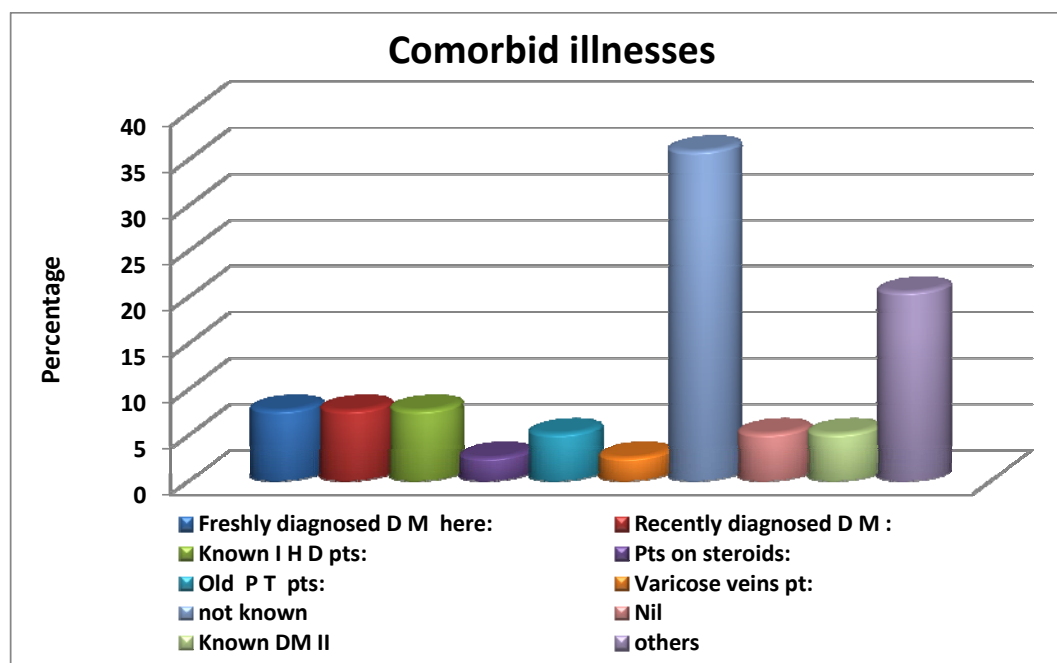
Parts affected	No. of cases	Percent
Lower limb	26	67
Scrotum & Lower Abdomen	8	20
Upper Limb	4	10
Trunk with limb	1	3
Total	39	100



Average time of presentation after symptoms 7.4 days

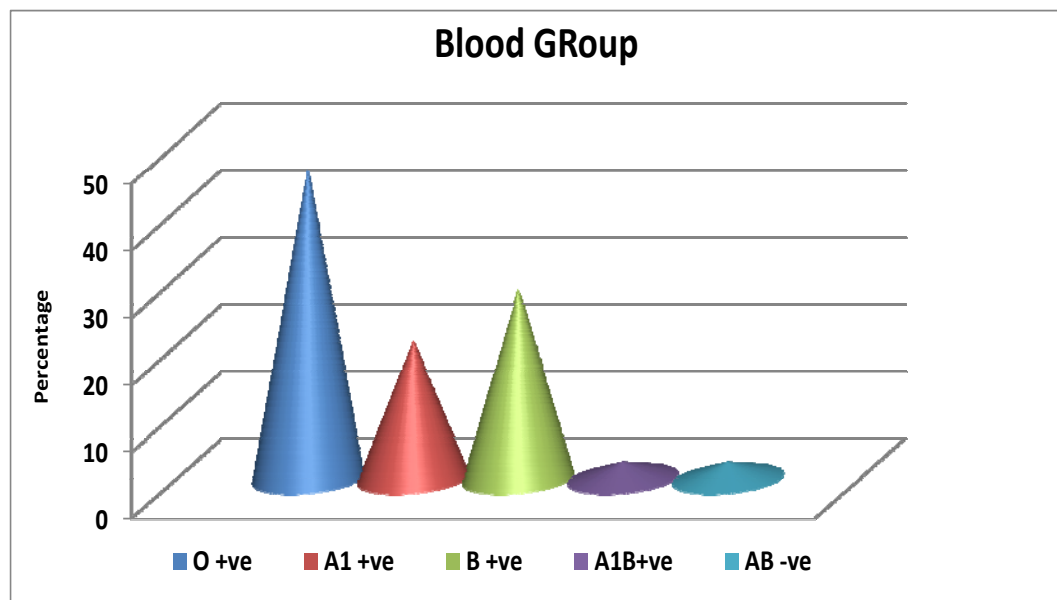
COMORBID ILLNESSES

Comorbid illnesses	No. of Cases	Percentage
Freshly diagnosed D M	3	8
Recently diagnosed D M	3	8
Known I H D pts:	3	8
Pts on steroids:	1	3
Old P T pts:	2	5
Varicose veins pt:	1	3
Nil	16	41
Known DM II	2	5
Others	8	21



BLOOD GROUP AFFECTED

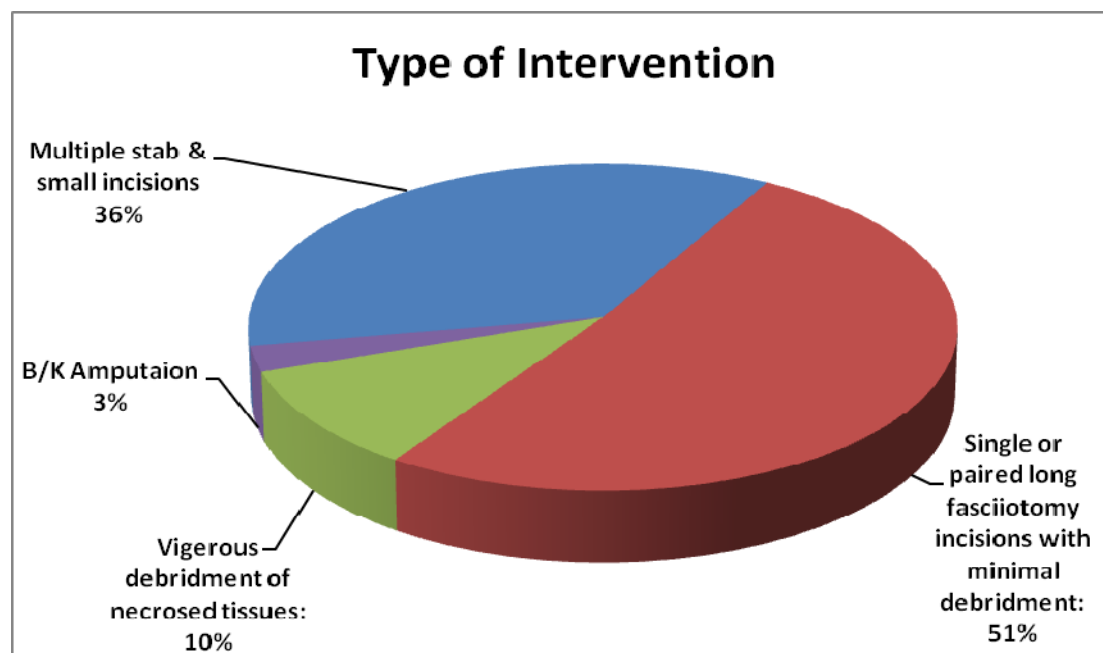
Blood Group	No.of Cases	Percent
A1 +ve	8	20.5
A1B+ve	1	2.5
AB -ve	1	2.6
B +ve	11	28.2
O +ve	18	46.2
Total	39	100.0



AVERAGE TIME TAKEN FOR INTERVENTION = 6.4 hrs

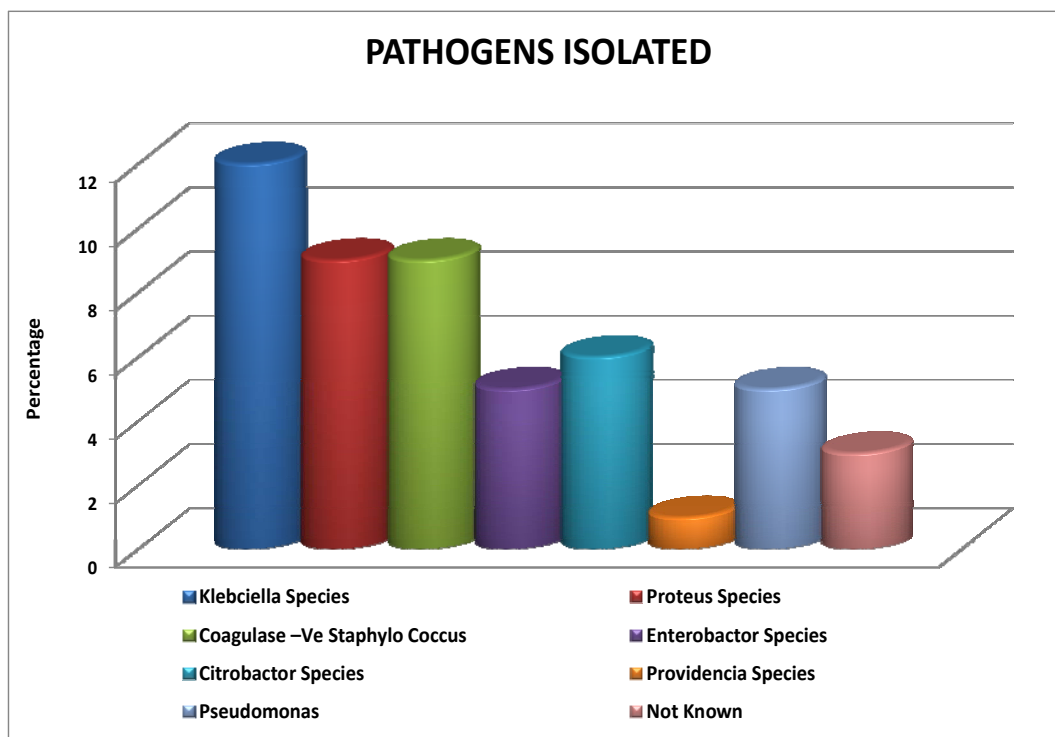
TYPE OF INTERVENTION

Type of Intervention	No.of Cases	Percent
Multiple stab & small incisions	14	36
Single or paired long fasciitomy incisions with minimal debridment	20	51
Vigerous debridment of necrosed tissues	4	10
B/K Amputaion	1	3



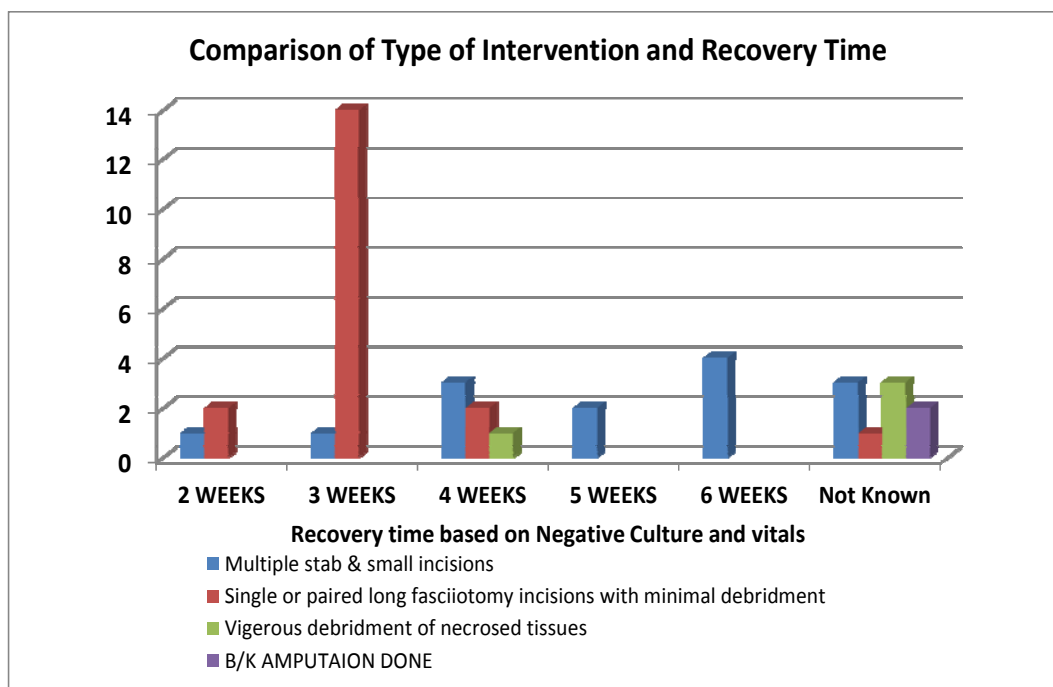
PATHOGENS ISOLATED

Pathogens Isolated	No.of cases
Klebsciella Species	12
Proteus Species	9
Coagulase –Ve Staphylo Coccus	9
Enterobactor Species	5
Citrobactor Species	6
Providencia Species	1
Pseudomonas	5
Not Known	3



COMPARISON OF TYPE OF INTERVENTION AND RECOVERY TIME

Recovery Time in Weeks	Multiple stab & small incisions	Single or paired long fasciotomy incisions with minimal debridment	Vigorous debridment of necrosed tissues	B/K Amputaion Done	
2	1	2			3
3	1	14			15
4	3	2	1		6
5	2				2
6	4				4
Not Known	3	1	3	2	9



DISCUSSION

DEFINITION

Necrotizing soft tissue infections are rapidly progressive and often fatal. Infection of the soft tissue fascia deep to the muscles, popularized in the lay media as “flesh – eating bacteria” It is a potentially life threatening emergency. Early diagnosis and rapid aggressive surgical intervention reduces the morbidity and mortality. Uncontrolled necrotizing soft tissue infections lead to sepsis, multiorgan failure & death.

Major Predisposing factors:

1. Old age
2. Diabetes mellitus
3. Severe malnutrition
4. Severe peripheral Vascular diseases
5. Alcoholism
6. Immuno Suppression
7. Malignancy
8. Obesity
9. Intravenous drug abuse
10. Radio therapy
11. Renal failure
12. Steroid intake
13. Post Chemotherapy patients

It starts with minor insult to the skin in known cases. The additional cause in this study, in Chengalpattu- Snake bite is also one of the causes that defer from other studies.

It begins as snakebite cellulitis; care has not given progress to necrotizing soft tissue infection which involves skin, subcutaneous tissue & deep fascia

MICROBIOLOGICAL INVOLVEMENT

Proteus species are the most common encountered Bacteria in necrotizing soft tissue infections & they are common in Diabetic patients.

Other species are E.Coli, Klebsiella, Pseudomonas & bacterioides. The culture & Sensitivity done in all cases .The average time taken was 2 – 3 weeks for negative culture. 3 cases died due to late presentation, their culture results are proteus vulgaris .30% of cases had mixed infections.

SITE OF INVOLVEMENT

The common site of involvement is lower limb. Other areas affected are upper limb, perineum & associated areas, & trunk

CASE PRESENTATION

All cases reported more than two days after the initial symptoms. Four patients died in this study due to very late presentation one case presented 4 days after initial symptoms that involved lower limb. One case that was presented in 12hrs, known case of DM, IHD, died inspite of vigorous wound debridement & resuscitation.

The snake bite cases presented in fourth or fifth day with involved limbs are positive for klebsiella & pseudomonas.

TIME TAKEN FOR SURGICAL INTERVENTION

The average time for surgical intervention is 4 – 6 hrs. This study involves all surgical units in Chengalpattu Medical College. The mode of intervention differs in each other. The study was done to compare the advantage of single large incision to multiple small incisions.

The types of surgical intervention.

- Multiple small incisions
- Vigorous debridement including amputation of the affected part.
- Observation with minimal debridement
- Long incisions over affected part

Time of recovery

The time was taken for recovery is based on negative culture & vitals. The average time of recovery is 3 weeks in all cases except the cases with long incisions. They had fast recovery within 5 to 7 days.

The long single or additional incisions had a quick recovery from inflammation & better tissue perfusion due to decompression. The edema subsided by third day and the culture was negative by second week. The wounds of long incisions healed by secondary intention in majority of cases & few only needed secondary suturing. SSG was not needed in all long incision cases except one case in that the trunk was involved. Only 50% success rate in

SSG done with culture negative cases. Snake bite cases, decompressed needed secondary suturing (healing by third intention) .The failure rate was high in secondary suturing done in Snake bite cases.

They were allowed to heal by secondary intention & only 30% needed SSG. Better & faster recovery was seen in long incision cases.

THE ADVANTAGE&DISADVNTAGE OF LONG INCISION CASES

Undoubted the long incision cases done progressed to faster recovery from local inflammation & needed no further debridement or with minimal debridement. The recovery of tissue ischemia was fast due to major decompression.

Only 30% of cases needed secondary suturing& other healed well by secondary intention.

The disadvantages of the long incision are variable. The problem that was encountered on table was bleeding & managed by catgut ligation & compression bandages. The scar was the major disadvantage.

Medical management

Ceftriaxone 1gmivbd, metronidazole 400 mg tds, and gentamycin 80mg, IV bd were given empirically before getting culture & sensitivity report after getting R F T. Every week culture was done. Later according to the culture sensitivity reports antibiotics were given. The negative culture report was received on third week in majority of cases. Adequate nutrition was ensured& blood transfusion required in majority of cases.

BD Dressing was done. The local application used was povidine Iodine. Wounds were managed by hydrogen peroxide in selective cases & saline wash. H₂O₂ not used in freshly granulating tissues. Diabetic control was achieved by insulin in diabetic cases. IV fluids with multivitamin & amino acids were also given to improve nutritional status. The hyper baric oxygen therapy was not used because unavailability. 100% oxygen was given in initial resuscitation. MATTHAN THAYLAM (a siddha medicine product) was used in few cases showed improvement in granulation & deodorizes the wound. One patient developed maggots and managed by turpentine solution.

OUTCOME

Out come was faster & better in cases of long incisions except the disadvantage of scarring. Other managements like multiple small incisions and vigorous wound debridement needed more time of work and slow recovery. Four patients died due to late presentation& co morbidity.

SUMMARY & CONCLUSION

The following are conclusions that could be inferred from the study on the surgical spectrum and risk factors among the diseased.

- The patients more affected are above 50 yrs (56%).
- The male: female ratio is 4:1
- Type of insult

Not known	36%
Snake bite	18%
R T A	10%
Throne prick	5%
Minor abrasions	10%
Others	21%

Parts affected

Lower limb	67%
Scrotum & Low Abdomen	20%
Upper Limb	10%
Trunk with limb	3%

Average time of presentation after symptoms: 7.4 days

Comorbid illnesses

Total number of D M patients 39

Freshly diagnosed D M	8%
Recently diagnosed D M	8%
Known I H D pts	8%
Pts on steroids	3%
Old P T pts	5%
Varicose veins pt	3%
Nil	41%
Known DM II	5%
Others	21%

Blood group affected

A1 +ve	20.5%
A1B +ve	2.5%
AB -ve	2.6%
B +ve	28.2%
O +ve	46.2%

Average time taken for intervention: 6.4 hrs

Type of intervention:

Multiple stab & small incisions	}	36%
Single or paired long fasciitomy		51%
incisions with minimal debridment		
Vigorous debridment of necrosed tissues		10%
Amputaion (B/K)		3%

Average time taken for recovery (from septicemia& negative culture):

Unknown insult cases with long incision fasciitomies require 3 weeks average.

Snake bite cases require average 3.8 weeks.

The edema & discharge disappear on 4th to 7th day in unkown insult cases. Snake bite cases also.

Multiple stab & small incisions required more than five weeks for –ve Culture & recovery from local symptoms. The edema & discharge persisted more than 25 days in these cases.

PROFORMA

Name : IP NO:
Age : DOA :
Sex : DOD :

- Type of insult : (if known)
- Time lapse between onset of symptoms & Hospitalisation

Symptoms

- Fever with rigors
- Vomiting & diarrhea
- Pain & skin anesthesia

Past History

Co morbid illnesses + their present management

CLINICAL STAGING ON PRESENTATION

STAGE 1

- Tenderness to palpation: (extending beyond the apparent area of skin involvement)
- Erythema
- Swelling
- Warm to palpation

STAGE II

- Blister or bulla formation (serous fluid)
- Skin fluctuance
- Skin induration

STAGE III

- Hemorrhagic bullae
- Skin anesthesia
- Crepitus
- Skin necrosis with dusky coloration progressing to frank gangrene.

SYSTEMIC EXAMINATION

Vitals on Admission:

	Pulse,	BP,	Temp,	RR
CVS	-			
RS	-			
CNS	-			
GIT	-			

INVESTIGATIONS

Blood – Urea	Blood- Hb %
- Sugar	- T C
- Creatinine	- D C
- Electrolytes	- E S R

Blood grouping & typing -

Number of units transfused-

- X-ray Chest –
- X-ray of affected area –
- CT Scan
- USG
- Pathogens isolated (serial cultures) & their sensitivity to antibiotics.
- No of days after debridement for Negative culture :

SURGICAL MANAGEMENT

Time taken for wound debridement from the time of admission.

Type of surgical intervention –

- Decompression by multiple stab & small incisions
- single long incision (included fasciotomy)
- vigorous debridement (excision of affected tissues)
- No of sittings for debridement :
- Recovery time (based on vitals & - ve culture)

Complications

- During debridement-
- After debridement-

Management of the segulae

- Blood transfusion -
- Allowed to heal by secondary infection -
- Secondary suturing-
- Skin grafting-
- Others. –

Other complications due to systemic illnesses & their importance.

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Case Study Pictures



Snake Bite Fasciitis – Secondary Suturing Failed



Run Over Injury – Fasciitis involving full circumference of thigh



Preop Raw Area – A case who had extensive debridment



SSG done in the same case – 90% take



Necrotizing Fasciitis – In a Paraplegia case



Same Paraplegia Case – Healing Phase healed well in Secondary Intention



NSTI – Involving Lower abd & Perinium healed well after Secondary Suturing



NSTI – Involving Left side of trunk & Left LL, healed well by Secondary Suturing



Impending Fasciitis – After Native Treatment



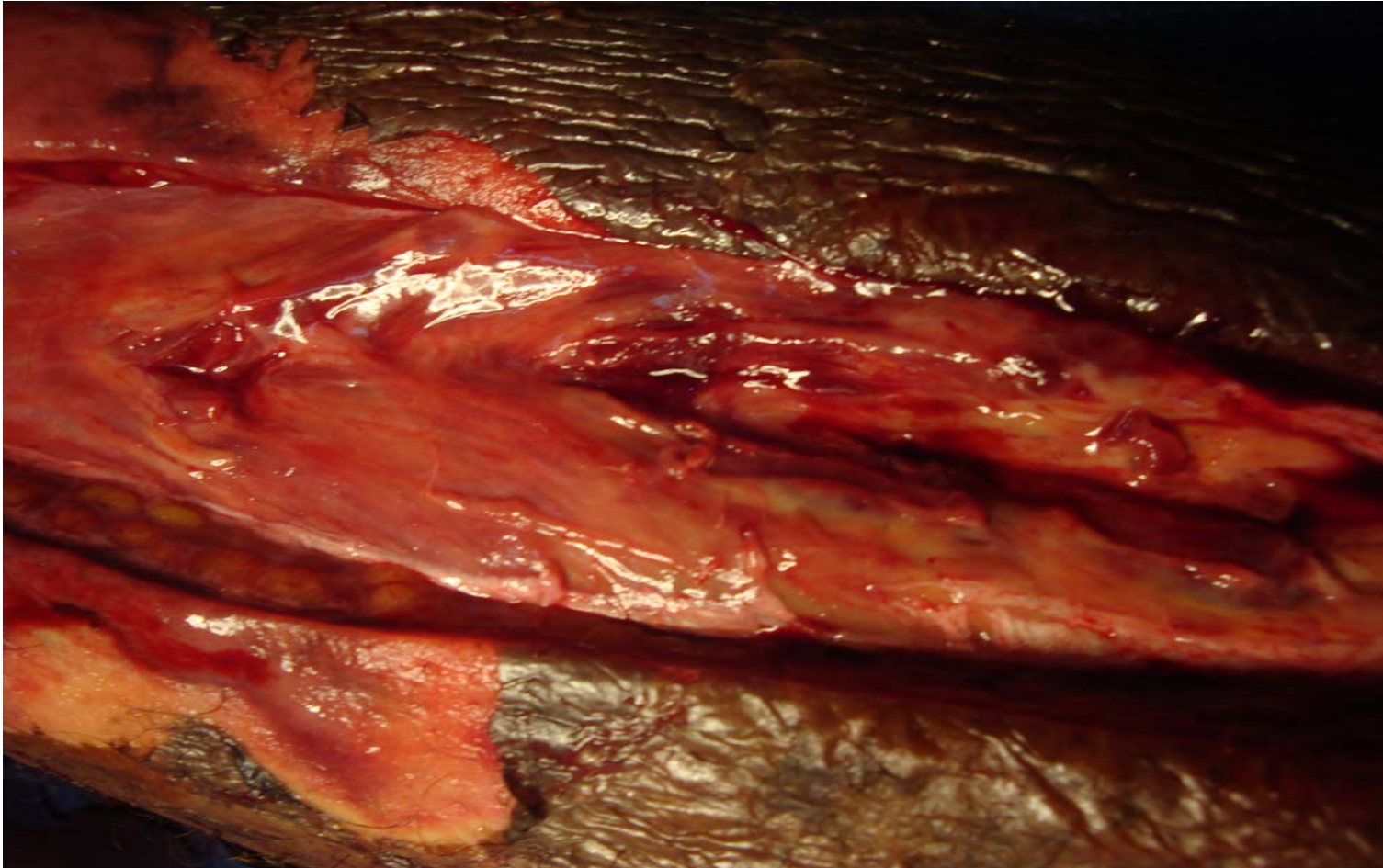
Single long Incision in a Snake bite case – Healed well by Secondary Intention



Snake Bite Fasciitis – Healed well by Secondary Intention



A Case of fall from height – Presented with extensive fasciitis



NSTI – Extending up to the muscular layer



Late Presentation – Patient expired next third day



Failure of Long Incision fasciotomies – Needed extensive debridement



Impending Snake Bite Fasciitis