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Management of *Agantu Vrana* (Crush injury) caused by road traffic accident - A Case Study

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ABSTRACT

Introduction: '*Vrana Gatravichurnane*' when there is a disintegration or discolouration of site the it is a *Vrana*.^[1] There are two types of wound according to *Sushrutacharya*. One is *Nija* and another is *Agantu Vrana*.^[2] Crush injury is one where a part of the body is being squeezed / compressed between two force or pressure system. It causes extensive lacerations, bruising, compartment syndrome, crush syndrome, fractures, haemorrhage etc. with extensive tissue destruction and devitalization. Renal failure, hypovolemic shock and sepsis are most dreaded problems in crush injuries.^[3] **Case Presentation:** A twenty six years male patient presented with A/H/O RTA with injury to left lower limb with profuse bleeding. Xray left foot s/o fracture of left tibia and fibula lower end. Multiple contused and lacerated wounds present over left lower limb. **Management and Outcome:** Debridement of wound along with open reduction and fixation with external fixators done. Followed by VAC dressing and skin grafting. **Discussion:** Stages of wound healing seen as per literature by *Sushrutacharya*. *Ashudhha*, *Shudha*, *Ruhyamana* and *Rudhh Vrana*. This case report proved that after debridement of wound and VAC along with skin grafting showed fast wound healing.

Key words: Debridement, VAC, Skin Grafting, *Agantu Vrana*, Crush Injury

INTRODUCTION

A wound is a break in the integrity of the skin or tissues often, which may be associated with disruption of the structure and function.^[4]

A crush injury occurs when a body part is subjected to a high degree of force or pressure, usually after being squeezed between two heavy or immobile objects. Damage related to crush injury includes lacerations, fractures, bleeding, bruising, compartment syndrome and crush syndrome.

It is caused by war wounds, road traffic accidents, tourniquet.

It leads to:

- Compartment syndrome.
- Muscle ischaemia.
- Gangrene, loss of tissue.

Stages of Wound Healing^[5]

- Stage of inflammation. (*Ashudha Vrana*)
- Stage of granulation tissue formation and organization. (*Ruhyamana Vrana*)
- Stage of epithelialization.
- Stage of scar formation and resorption. (*Rudh Vrana*)
- Stage of maturation

Factors affecting Wound Healing

Infection, Presence of necrotic tissue and foreign body, Poor blood supply, Tissue tension, Hematoma, large

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defect or poor apposition, Recurrent trauma, X-ray irradiated area, etc.

Management of crush injury

If it is a crushed or devitalized wound there will be oedema and tension in the wound. So, after wound debridement or wound excision by excising all devitalized tissue, the oedema is allowed to subside for 2-6 days. Then delayed primary suturing is done. If it is a deep devitalized wound, after wound debridement it is allowed to granulate completely. Later, if the wound is small secondary suturing is done. If the wound is large a split skin graft (Thiersch graft) is used to cover the defect.

According to *Sushrutacharya*, when there is a disintegration or discolouration of site then it is a *Vrana*.^[1] Crush injury comes under heading of *Agantu Vrana* which consists of *Chhinna*, *Bhinna*, *Viddha*, *Kshata*, *Picchit*, *Ghrushta*.^[6] *Sushruta* stated *Apatarpanadi* 60 *Upakarama* (treatments) for different kinds of wound.^[7]

CASE REPORT

A twenty six years male patient brought by relatives with A/H/O Road traffic accident with crush injury at left lower limb. Managed with surgical intervention.

AIMS AND OBJECTIVES

To study case of crush injury due to RTA

Type of study

Observational single case study without control group

Study Details

Age - 26 years

Gender - Male

Religion - Hindu

Occupation - IT worker

Diet - Non Vegetarian

Brief history

Patient presented with 12 hours old contused lacerated wound over left lower limb due to road

traffic accident. Xray left lower limb s/o displaced comminuted fracture of lower end of tibia and fibula. CLW approx. 5-6cm length at left fore foot.

On examination: No any comorbidity seen

Family History: Not significant

Local examinations

CLW: At left fore foot - Approx. 5 x 2cm

At anterior tibial region - Approx 4 X 1cm

Lacerations over left shin

Lab Reports

HB % - 12.5 gm%

WBC - 8,000 /Cumm

Sr.Creatinine - 0.9mg/dl

BSL-R - 2 mg/dl

Blood Urea - 22mg/dl

Urine - NAD.

X-Ray chest - WNL

ECG – WNL

Treatment and Outcome

- Primary dressing and suturing of wounds done in ER
- Patient admitted in intensive care unit with antibiotic and IV fluid support
- Debridement and Open reduction with external fixation done along with primary closure of CLWs. Patient shifted to ICU for post op management. Shifted to ward on POD 2 when patient was haemodynamically stable.
- Daily dressing done.
- On POD 3 patient presented with breathlessness and Fever (101°F). CT thorax s/o minimal haemothorax on left side with SPO₂- 86-88% on RA
- O₂ support started with antibiotic step up. Patient responded well to given line of treatment
- On POD 4 disclouration of wound at forefoot and shin noted.

- Debridement of wound done under spinal anesthesia and VAC applied.
- Patient discharged with external fixators and VAC dressing in situ
- VAC continued for 2 weeks
- Patient underwent debridement with partial thickness skin grafting with VAC coverage on POD 16
- VAC dressing continued for 7 days and removed. Dressing after every 5 days done
- Graft accepted well.

Treatment given

- Inj. Pan 40 mg IV 12 hourly for 5 days
- Inj. Emeset 4mg IV 12 hourly for 5 days
- Inj. Supacef 1.5gm IV 12 hourly for 5 days
- Inj. Amikacin 500 mg IV 24 hourly for 3 days
- Inj. Piptaz 4.5 gm iv 8 hourly for 5 days
- Inj. Diclofenac sodium 75 mg I.M. 8 hourly for 2 days.

Then Oral Medicine given for 10 days.

- Tab. Ceftum 500 mg BD
- Tab Pantocid D BD
- Tab Rhexical plus OD
- Tab Chymoral Forte BD

OBSERVATIONS AND RESULTS

Pre Operative




Post Operative

POD 0



POD 1



After 2 weeks of VAC dressing and skin grafting



POD 4



After recovery



Discharge	++	+	0	0
Indurations	++	+	+	+
Discoloration	+++	++	0	0
Edges	+	++	0	0
Fever	+	+	0	0

DISCUSSION

Different modalities of wound management were observed during study. Along with different stages of *Vrana*. *Ashuddha Vrana* which was present before debridement containing foreign bodies. *Ruhyaman Vrana Lakshan* seen during daily dressings are different at different stages. Patient posted for Skin grafting after achieving *Shuddha Vrana* Signs of wound.

CONCLUSION

In this case, due to accident extensive devitalisation of tissue occurred along with communitated fracture of tibia and fibula. Internal fixation was not possible due to fragmentation of bone. External fixation was done with primary closure of CLW. The dorsalis pedis artery was compromised.^[8] Wound over forefoot and shin got necrosed which needed debridement and as primary closure was not possible it was covered with skin grafting which resulted in tertiary wound healing.

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Gradation criteria for assessment of wound

Parameters for assessment	0	+	++	+++
Pain	No	Mild pain during movement, no painkiller required	Moderate pain at rest, painkiller required	Sever pain which disturbs the sleep & sedatives required
Discharge	No	Mild serous discharge	Moderate Discharge	Pus Discharge
Indurations	No	Localized	All over Around Wound	Widespread over space
Discoloration	No	present	present	necrosis
Edges	normal	Slightly discolored	moderate necrosis	necrosed

Observations of prognosis of wound as per assessment criteria

Criteria	POD 1	POD4	After 2 nd week	After 3 rd week
Pain	++	++	0	0

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