STARSIL Hemostat or STARSIL Combat in Burn Wounds

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Introduction:
Starsil Hemostat or Starsil Combat (Carboxymethyl-Starch) has been widely used in operations and wound management especially to its hemostatic, stimulation of healing, antimicrobial, nontoxic, biocompatible and biodegradable properties. This article covers the antimicrobial and wound-healing effects of applications of Starsil Hemostat and Starsil Combat in wounds caused through heavy burns. Starsil can be used to prevent or treat wound and burn infections not only because of its intrinsic antimicrobial properties, but also to prevent insured tissue by forming a gelly mass over the damaged tissue and therefore act as a mechanical barrier. It can also be used as a to improve wound healing.

Classification of burns:
Burns are classified by their depth and severity as 1st, 2nd, 3rd and 4th degree.
First-degree burns involve only the epidermis and are normally limited to redness (erythema), a white plaque and minor pain at the site of injury.
Second-degree burns manifest as erythema with superficial blistering of the skin, involving the superficial (papillary) dermis and may also involve the deep (reticular) dermis layer.
Third-degree burns occur when the epidermis is lost with damage to the subcutaneous tissue. Burn victims will exhibit charring and extreme damage of the epidermis, and sometimes hard eschar will be present.
Fourth-degree burns damage muscle, tendon, and ligament tissue, thus result in charring and catastrophic damage of the subcutaneous tissue.

Burns can also be assessed in terms of total body surface area (%TBSA), which is the percentage affected by partial thickness or full thickness burns.

STARSIL® HEMOSTAT or STARSIL Combat
STARSIL® HEMOSTAT or Starsil Combat (HEMOTEC MEDICAL GmbH, Velen, Germany) is a hemostat consisting of 3-5 g purified plant-based absorbable polysaccharide that can be administered to the entire operation or wound area. It is a “second generation” starch-based hemostat. When compared to a “first generation” product, it has distinct advantages, e.g. significantly increased water absorption quantity (here: 64 ml/2 g powder). The powder is available off-the-shelf without any further preparation. In order to obtain hemostasis it can be applied directly onto a bleeding wound. The hemostatic effect results from rapid dehydration and subsequent concentration of blood components like red blood cells, platelets and serum proteins (thrombin, fibrinogen, etc.), thus accelerating the clotting cascade. As a result a gelled adhesive matrix is produced. This gelled matrix functions as a barrier and protects the wound surface, e.g. wounds from burns. Therefor it protects from infection, keeps the wound
moistend and allows therefore a better healing of the wound or improves e.g. acceptance of skin transplant on the burned wound. It can be used on any burned surface, independent of the depth and severity degree (1 to 4) or % TBSA.

Absorption of the Starsil particles is achieved within approximately 48 to 72 hours. STARSIL ® HEMOSTAT is biocompatible, non-pyrogenic and does not contain any allo- or xenogenic additions.

**Clinical Experience:**
Starsil Hemostat and Starsil Combat was used for wound treatment after heavy burns at the Department: Clinic for General Surgery, Military Medical Academy, Belgrade, Serbia and in the Department for Plastic and Reconstructive Surgery, Clinical Center of Serbia, Belgrad Serbia: Starsil was applied directly at on the wound at the area of the accident. After transportation to the hospitals, Starsil was used again before placing a wound dressing, during operation or e.g. skin transplantation. The results when used Starsil were rated from all doctors as good or very good.

**Example cases:**

**CASE 1: Heavy burned forearm**

![Figure 1: Use of STARSIL on heavy burned forearm.](image-url)
Figure 2: STARSIL forms a gelled matrix that works as a barrier.

Figure 3: Optimal result after skin transplantation.
CASE 2: Heavy burns caused by multiple electrocutions

A 26 years old patient, male, was received at the clinic due to heavy burns caused by multiple electrocutions. Left forearm was dorsally burned with burned area of about 0.5% of total surface and on right forearm burned area was about 1% of total surface.

Deep burns (Degree III) were localized on left foot (dorsum) in area of medial maleolus, and V metatarsal bone. Front side of left thigh was deeply burned with carbonized fragments of skin and subcutaneous tissue as well as central destruction of soft tissues. Dorsal side of right thigh was deeply burned in infragluteal and perianal regions, containing carbonized tissue fragments. III degree burns – about 10%, second degree burns – about 2%.


Op: Laparatomia mediana inferior ileostoma bipolaris.


After performing major operations to remove destroyed tissue, we faced a serious problem – big areas of open wounds on both thighs and gluteus with significant amount of diffuse bleeding. The biggest wound area was about 47x25cm on left thigh. We used StarSil® haemostatic agent to cover critical bleeding areas and stop diffuse bleeding before the final wound treatment. We removed excessive blood from the site and applied in total 3 vials of StarSil® powder, following carefully instructions for its application. That amount was sufficient to cover the area and achieve satisfactory hemostasis. Usage of disinfection agents (iodine solution and Ocstenisep®) for sanitizing operating site prior to necrectomia did not compromise subsequent action of StarSil® hemostatic powder, which was able to form stable stasis layer fast and effectively.
Case 3:

Op: Desarticulatio glenohumeralis l. dex.

Op: Excision tangentialis reg. fem. et cruris l. sin. et thoracis et tegmenti abdominis. Reconstructio cum HT.

Op: Excision tangentialis tegmenti abdominis reg. inguinalis l. dex. Reconstructio cum HT.


There was no apparent difference in bleeding prevention related to StarSil® application before or after positioning of skin graft. Controls after the surgery showed no influence on skin graft acceptance could be registered as result to usage of StarSil® haemostatic agent – the acceptance of HT and AT was in all cases successful.