Revolutionary Treatment for Burns

By

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A burn is the coagulative necrosis of tissues. Coagulation means precipitation of protein, therefore coagulated necrosis is liable to occur. For patients with fifty per cent. of the body burned, the mortality rate is at present thirty-four per cent.; previously it was ninety per cent.

The treatment of burns is still being changed, even though the basic principle remains more or less the same. Modern treatment of burns is with diluted silver nitrate (AgNO₃). This is revolutionary treatment, as the results have proved. This treatment was developed in 1964 by Carl A. Moyer, Head of the Department of Surgery at Washington University in St. Louis, and was reported with supporting case material in the June 1965 Archives of Surgery. He reports that the effect on patients with silver nitrate treatment is “unbelievable until it is seen...more than 90 per cent. of that which has been written and said about burns during the last fifty years can be discarded because it is false.”

The strength of the silver nitrate solution is 0.5 per cent., or 29.4 millequivalents per litre. It has been observed that this concentration of silver nitrate, that is 0.5 per cent. of AgNO₃ has the following advantages:

1. It has anti-microbial and bacteriocidal properties
2. It is non-toxic and is stable in distilled water.
3. It does not interfere with proliferation of the epidermis.
4. It is not harmful to viable cells.
5. It is not antigenic.
6. It prevents the growth of bacteria, and allows skin to re-generate.

Above all, treatment with 0.5 per cent. AgNO₃ is cheap, quick and effective.

Silver Nitrate solution is supplied in coloured containers to prevent light exposure and break down of solution. Concentrations of silver nitrate of 0.1 per cent. or higher are injurious to tissues. Distilled water is the solvent for the silver nitrate.

When the 0.5 per cent. AgNO₃ solution is applied over the burned area, gradually a chemical change occurs. AgNO₃ and salts from the tissue fluids act together and silver chloride forms—AgNO₃+(Cl) AgCl. Water produced from the chemical change evaporates. In order to keep this procedure balanced, the area must be soaked every four hours with 0.5 per cent. AgNO₃.

Gauze dressing pads of 30-32 layer thickness are individually prepared. No cotton wool is used. Gauze pads are applied to the burned surfaces and are saturated with 0.5 per cent silver nitrate solution, and the entire area is covered with two layers of stockinette. Stockinette is fixed with a safety pin or surgical tape. To aid subsequent moistening of the dressing, catheters may be used.

For the dilute 0.5 per cent. AgNO₃ to be effective, the dressing must be sufficiently thick to hold a large liquid volume. This thickness of dressing is an essential. It retains moisture and heat. Another important fact is that the dressing must be kept wet, so that the solution maintains continuous contact with the wound surface. Any grease, detergent or soap which may be present must be removed before the application of 0.5 per cent AgNO₃ solution.

It is advisable after the initial treatment for shock etc., that the burned surface should be washed with hexachlorophene followed by distilled water. This will remove any dirt and grease present. Then the dressing is done as stated above. The entire dressing is changed every 12-24 hours, depending on the wound exudation. Dead tissue is removed with each dressing. Cultures are taken when necessary. Antibiotics are withheld until clinical evidence of infection exists. Skin grafting may be done in cases of deep burns at 1-2 week intervals. Blood specimens are checked periodically for electrolyte balance. Diet is given as tolerated, but should contain plenty of protein, salt and fluids. Urinary output should be measured carefully.

In severe cases the patient is placed every two days in a fifty gallon tub containing a temperature-controlled, balanced salt solution.

Equipment necessary for changing silver nitrate burn dressing:
- Basin (medium)
- Gauze pads—30-32 layer thickness
- Stockinette
- Syringe
- Irrigation tubing
- Culture media
- Culture tubes
- Plastic apron
- Rubber or plastic gloves
- Scissors
- Surgical tape

It is not considered necessary for rigid aseptic techniques to be carried out. However, clean dressings, sterile gloves and instruments are used. Masking and gowning of personnel is not routine. Plastic aprons are worn for the protection of uniforms. Frequent hand washing, and restriction of personnel with respiratory or skin infections are the main precautions against infection.
Helping the patient to achieve psychological well-being is no less important than the healing of his burns. It is important not only to be kind and understanding, but also to encourage self-help. Physiotherapists are consulted to prevent the formation of contractures.

The main disadvantage with the use of silver nitrate is the black staining of everything that comes into contact with the solution. The following steps have been taken to deal with this problem:

1. Patients are nursed in a separate room kept especially for this treatment.
2. Patients are not allowed to walk around the hospital.
3. Plastic aprons and rubber gloves are used to protect the uniform and hands from the black staining.
4. Gauze pads are used once, then washed, autoclaved and reused.
5. Separate bed linen is kept for this purpose.

Some of the beneficial aspects in the case of burned patients treated with AgNO₃ are:

1. Reduction of infection.
2. Prompt healing of second degree burn wounds.

This new treatment is now carried out with modifications suitable to the Punjab, in the Christian Medical College Hospital, Ludhiana, with very good results. The following is a short case study of a patient who was treated with 0.5 per cent silver nitrate solution:

R.S. a 26-year-old young man was brought to hospital at 4 p.m. on 4.5.1966. This man, a soap factory worker, was alleged to have sustained burns of the hands and arms (10 per cent, area) two hours prior to admission. He was conscious and explained that he was involved in a boiler explosion. Super heated steam and sodium-silicate fell on his hands and arms. The right side of the face was slightly affected by the steam. The right eye was closed. His co-workers brought him to the hospital as soon as possible. He received no treatment from outside. The patient was complaining of severe pain. Intravenous morphine sulphate 10 mgm was given with good effect, and was repeated every four hours for the first twenty-four hours. He was admitted to the room which is specially reserved for this type of treatment. Routine admission procedures were carried out.

Examination revealed second degree burns of the lateral aspect of the right arm with blister formation. The dorsum of the left hand and lower forearm were partially involved. Diagnosis: second degree burn of the upper limbs—burned area 10 per cent.

Injection A.T.S. 3,000 units and A.G.S. 10,000 units were given as a precaution. Blood pressure and pulse rate were recorded half hourly and remained normal. After the initial treatment to relieve pain etc., the burned area was dressed as follows:

Both hands were cleaned with normal saline, special care being given to the burned area. Then the burned area was thoroughly cleaned with silver nitrate 0.5 per cent. solution. Bullae were opened, and all the loose skin removed. All the burned surfaces were then covered with thirty layer thickness gauze dressings, which had been saturated with 0.5 per cent. AgNO₃. The entire area was covered with two layers of stockinet, and it was fixed with surgical tape. The dressing was kept wet by soaking with 0.5 per cent. AgNO₃ every four hours throughout the day and night.

The ophthalmologist was consulted, and both eyes were examined. There was evidence of conjunctivitis, secondary to scalding. Terramycin ointment was applied twice a day. The eyes responded well to this treatment. On the first day of admission the patient was given fluid diet. Next day light diet was given. He tolerated it well, and the diet was increased to a normal diet.

Urinary output was normal.

The entire dressing was changed twice daily. By the thirteenth day after admission the left arm was clean and granulation tissue was formed, so it was left exposed. On the right forearm there was a thick layer of slough. The dressing and soaking was continued as stated above. The physiotherapist taught the patient the necessary exercises to prevent the formation of contractures.

At the time of writing R.S. is still in hospital. His wounds have at no time shown any sign of infection. As Professor Carl A. Moyer said the effect of Silver Nitrate Treatment on patients is "unbelievable until it is seen".

I would like to acknowledge the encouragement given to me by Dr. F.C. Eggleston and the Principal Sister Tutor.