now confidence that the method is capable of defibrillating the heart in coronary thrombosis, and because of the frequency with which the general practitioner is faced with this situation and the ease of application of the method recommends it to be kept in mind by others.

Since the occurrence of this case the methods of external cardiac massage have become more standardized and refined, but it is felt the case may still have some interest.

THE TREATMENT OF FIRST AND SECOND DEGREE BURNS

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The theme of this communication is that blisters are a preventable complication of burns. In the treatment of first and second degree burns, it is possible by anticipating the histamine reaction to prevent it, and so to prevent the consequences of a burn after it has been sustained.

This paper is not primarily concerned with third and fourth degree burns, in which there is actual coagulation or charring of tissues at the instant of burning.

The observation upon which this paper is based was made by me over 10 years ago, when a patient burnt herself on the cast iron handle of a grilling pan which she removed from the roasting oven with her bare hand. I was in the house at the time, and saw the burn within half a minute.

When I examined her hand, the shape of the hot handle was branded across her fingers and the distal part of the palm of her hand. The skin was white and shiny. With an instinctive impulse to prevent blisters from lifting, I immediately applied a tight cold water bandage to each finger individually and to the palm of her hand, with a pressure pad in the latter area. I used a cold water bandage, hoping that the cold would relieve the pain, which it did. I instructed the patient to wet the bandages repeatedly under the cold water tap—the indication for doing so being if she felt pain or the bandage got dry.

On removing the bandages about 2 hours later, I was very impressed to find there were no blisters at all. The skin was still white where it had been burnt, but there was no red reaction around the area of the burn. Cold water bandages were reapplied firmly, with the same instructions to keep them wet with cold water. The patient was only to do this at night if pain woke her. In fact, the
hand remained pain free, and the bandage was not re-soaked until morning. When I removed the bandages the next day, nearly 24 hours after the burn, it was almost impossible to see that she had been burnt, and the burnt area was very little more sensitive than the surrounding normal skin. It required no further treatment.

I have since repeated this technique on several occasions upon patients who have sent for me immediately they have burnt themselves. I treat such cases as extremely urgent. In those that I have seen within the first few minutes after burning, no blisters have subsequently lifted. Moreover, as a general practitioner I have made it my practice to instruct patients in this technique, and to advise them to keep a bandage near the cooker, which is where most burns happen. It is a treatment they can carry out themselves before sending for me, and this treatment has been repeated successfully by patients themselves.

The original observation reported in this paper was made more than 10 years ago: there were very obvious limitations in its application. It could only be applied efficiently to burns of limbs and digits which could be compressed. It could not be applied to the trunk or face.

The group of antihistamine drugs are disappointing when used to inhibit such a powerful histamine reaction.

With the advent of hydrocortisone, it at once occurred to me that we had a means of preventing the histamine reaction in other parts of the body, which had previously been inaccessible to treatment by cold and pressure.

The first patient for whom I used this method was a child who was brought into my consulting room having had boiling water spilt over it a few moments before. There was a brilliant erythema over about one quarter of the trunk, and a few very small blisters were starting to lift. As these blisters were already present, sepsis was an added risk, and so I used a preparation of hydrocortisone which also contained neomycin. Having excised the blisters, I rubbed the hydrocortisone and neomycin ointment thoroughly into the burnt area, including the raw surface of the blisters. I gave the mother a tube of the ointment, and told her to rub it in again three or four times, at about half-hourly intervals. When I saw the child 24 hours later, the erythema had entirely disappeared, no new blisters had lifted, and the ones which had lifted before I saw the child were dry. The ointment was rubbed in twice more that day, but I doubt if it was necessary.

A further type of burn, in which I have used a combination of these two treatments, was where a patient sustained an electric flash burn while I was in the house. The flash of the electric short
circuit denuded about one square inch of cuticle from between the thumb and forefinger, and scorched the proximal surfaces of the thumb and forefinger and the back of the hand. I again applied hydrocortisone and neomycin by rubbing it into the scorched and the denuded areas, and then bound the whole up at once with a firm cold water bandage. The next day, no blisters had lifted, the denuded area was dry, and the burnt area was almost painless. As the denuded area remained dry, it never became infected.

Although my experience has been limited to first and second degree burns, I can see no logical reason why it should not be applied to third degree burns. In these, some areas of whole thickness of skin are coagulated and so destroyed.

I make no claim that the treatment could affect the dead skin, but it could protect the remainder of the burnt area from a first or second degree reaction.

Whenever I have hydrocortisone ointment available, I always use it first and apply cold and pressure as well as far as possible. Moreover, I regard a tube of hydrocortisone and neomycin ointment as an essential part of my emergency equipment which I carry with me always. The hydrocortisone must be rubbed in very thoroughly, and not just smeared on, and it should preferably be 2\%\%. If blisters are present, they should be excised first, and an antibiotic such as neomycin should be used as well if it is available, owing to the risk of sepsis.

Whereas this paper is primarily concerned with anticipating and preventing the histamine reaction as it is met with in burns, the cold pressure technique is equally effective in controlling other local histamine reactions, as for example in crush injuries, which are not infrequent in general practice. The first case I treated in this way was my own hand which I trapped between my sliding garage door and the brick work.

The injury was of sufficient severity for me to expect marked swelling of my fingers. A thin leather glove I was wearing prevented abrasion of the skin. A tight cold water bandage for 12 hours prevented all swelling and virtually all disability.

Other examples of this type of injury which I have treated in this way include fingers trapped by falling windows. Small skin abrasions are no contra indication to the use of this technique. In crush injuries, blister formation is uncommon, presumably because the histamine is liberated at a deeper level.

The Histamine Reaction

The consequences of trauma to the tissues by burning or crush
injuries are thought to be brought about by the local production of histamine at the site of trauma.

The normal sequence of events in the reaction of the tissues to the local production of histamine are, in the first place, local vaso-dilatation, causing redness; as a consequence of this there is a transudation of plasma into the interstitial spaces, causing oedema; and if this is excessive, as commonly happens in the case of burns, then the oedema fluid will lift the cuticle as a blister, with the subsequent complications all too familiar in burns, of loss of body fluid from the raw surface, and ultimately sepsis.

**Theory of Mode of Action of Treatment**

My theory is that in the treatment I have described the application of cold will tend to produce vasoconstriction, and so counteract the histamine reaction of vasodilatation; and if successful in causing vasoconstriction, will prevent the consequent transudation of plasma, oedema, and blisters—but in any case the application of firm pressure also prevents the accumulation of oedema, and mechanically prevents the lifting of blisters. Of these two mechanisms, if anything the mechanical pressure is the more important. While the cold and pressure of the cold water bandage are working in these ways, any histamine that is formed is prevented from accumulating locally in the oedema, and soon gets carried away in the circulation, where it is harmless. Hydrocortisone is a specific antagonist to the inflammatory reaction.

I discussed this theoretical explanation for the success of these treatments with Professor Kahlson of Lund University, whose work on histamine is well known, and he agreed that the theory was sound, and that these treatments were a logical method of anticipating and preventing or antagonizing a local histamine reaction.

**Carpe Diem**

The histamine reaction does not develop instantaneously, but takes time, and during this short interval of time it is possible to inhibit it. This interval is of vital significance, as it affords an opportunity for preventing the consequences of trauma by burning and crushing after the trauma has been sustained.

**RETURN TO WORK**

Most doctors are familiar with the problem of getting some patients back to work. This may be due to the fact that the patient is so disabled as the result of disease or injury that they cannot