EXPERIENCE IN THE SHRINERS BURN INSTITUTE IN BOSTON

Alia Antoon and Hans Henning Bode

Department of Pediatrics, Harvard Medical School
Boston, Massachusetts

The results of supplementary parenteral nutrition in twelve children between the ages of two to fourteen years with severe thermal injuries are reviewed. Ten of these patients suffered third degree burns involving 50 to 90% of the total body surface. One of the children with a 30% burn had delayed healing due to severe malnutrition prior to his transfer to this hospital, i.e., loss of 50% of body weight. Another, four year old patient with 30% burns suffered anoxic brain damage and was unconscious for a period of six weeks.

In nine patients a central venous catheter had been placed for indications other than intravenous feeding. These central venous lines were then used for parenteral alimentation. As soon as the catheters were no longer considered essential for their care, supplementary nutrition was given through a peripheral vein in two of these children. In three additional patients the latter route was used entirely. Infusate for the central venous catheters was a hypertonic glucose solution containing 5% protein hydrolysate and 900 calories per liter ("MGH 900", see chapter by Dr. Fischer). For the peripheral infusion a 10% fat emulsion (Intralipid®, Vitrum) was used in combination with a solution containing 10% sorbitol and 5% L-amino acids (Aminofusin 600®, Pfrimmer) and a 15% glucose-fructose solution, pH 7.0, prepared by our hospital pharmacy.

RESULTS

Due to the extent of the burns in some of these patients, the central venous catheters were inserted through the burned areas. Recurrent episodes of sepsis necessitated frequent changing of
catheter sites. Out of the seven patients who received only central hyperalimentation, six died. Catheter sepsis contributed to the death in four of these cases. Post-mortem findings showed multiple septic emboli and mural thrombi at the catheter tips. One of the patients ruptured the vein at the catheter site due to local infection.

A two year old girl with 90% third degree burns survived. She had received central hyperalimentation for a period of two months. When catheter sepsis continued to be a major problem, she was treated by peripheral alimentation using 10% Intralipid®, Aminofusin 600®, and the hypertonic carbohydrate solution for a period of four weeks. This allowed intravenous provision of calories to 2,500 calories per square meter body surface per day. Her infection was controlled with the change from central to peripheral venous alimentation. Three other patients who were treated only with peripheral alimentation showed no evidence of infection that could be related to the intravenous therapy.

CONCLUSION

The results presented emphasize the dilemma that faces the physician caring for patients with extensive burns. The initial treatment of shock and the constant need for plasma and blood replacement demand a maintenance of an intravenous line. There remains, however, serious doubt if the benefits of central venous nutrition ever exceed the potential complications. Even in the patient in whom the catheter insertion sites have been spared from thermal destruction, there is frequent bacteremia during debridement and other procedures leading to the bacterial invasion of the thrombus at the catheter tip.

Our limited experience with the peripheral venous nutrition on the other hand is encouraging. The simultaneous infusion of fat emulsion and hypertonic solution containing carbohydrates and L-amino acids made it possible to provide almost the entire caloric needs intravenously. The infusion sites remained patent for as long as ten days and no major problem such as thrombophlebitis or sepsis was seen. The availability of fat emulsions has made such peripheral venous nutrition possible. It remains still to be seen if the pigment changes in the RES caused by Intralipid® interfere with the normal physiological function of this system.