

## INTRODUCTION / BACKGROUND

Patients with severe unreconstructable vascular disease (with or without diabetes) requiring amputation, often have postoperative wound complications, sometimes due to continued hypoxia. These complications can prolong hospital stays, lead to further surgery, and carry a high mortality rate. In a retrospective case series, Unruh et al. (Unruh 1990) reviewed 15 patients who progressed to hip disarticulation either because of a failed vascular repair, or failed above-the-knee amputation. 47% of the patients died, the majority of the hip disarticulation wounds developed an infection (59%) and none of the surviving patients were ambulatory with a prosthesis. Similarly, Endean et al. (Endean 1991) showed a 50% mortality rate in individuals with ischemia who progressed to hip disarticulation. Since hyperbaric oxygen can relieve hypoxia and improve wound healing in hypoxic wounds, it could be a useful adjunct in individuals with above-the-knee amputations and persistent ischemia, who may be facing a hip disarticulation.

## MATERIALS & METHODS

Four patients with above the knee amputations developed non-healing, necrotic wounds at the amputation site. These patients had severe, unreconstructable pelvic, groin, and amputation site ischemia after AKA and were likely facing hip disarticulation. One was diabetic. Three patients had obvious continued hypoxia at the wound site as evidenced by skin mottling and continued tissue necrosis. Two of the patients also had significant groin wounds. Hyperbaric Oxygen Treatments (HBOT) were added to the standard care of VAC dressings, wound debridement, and nutritional supplementation.

## RESULTS

All 4 patients went on to completely heal their stumps without major revision and were fitted successfully with prostheses. The groin wounds also healed. Skin mottling could be seen to improve immediately after the HBO treatments (Figure 1).

| Patient                              | 1      | 2      | 3      | 4             |
|--------------------------------------|--------|--------|--------|---------------|
| Age                                  | 54     | 60     | 65     | 63            |
| Diabetic                             | No     | Yes    | No     | No            |
| Smoking                              | Active | Active | Former | Active        |
| Wound hypoxic                        | Yes    | Yes    | Yes    | No (infected) |
| Pre albumin @ start of HBOT          | 15     | 14     | 10     | 13            |
| Treatment ATA                        | 2.4    | 2.0    | 2.0    | 2.0           |
| # of HBOTs                           | 29     | 39     | 27     | 23            |
| # of debridements after HBOT started | 4      | 5      | 2      | 0             |
| Days from surgery to start of HBOT   | 11     | 60     | 20     | 31            |

## REFERENCES

Unruh, T. et al. Hip Disarticulation: An 11-year Experience. Arch Surg 1990; 125(6), 791-793.  
Endean, E. et al. Hip Disarticulation: Factors affecting outcomes. J Vasc Surg 1991; 14(3), 398-404.

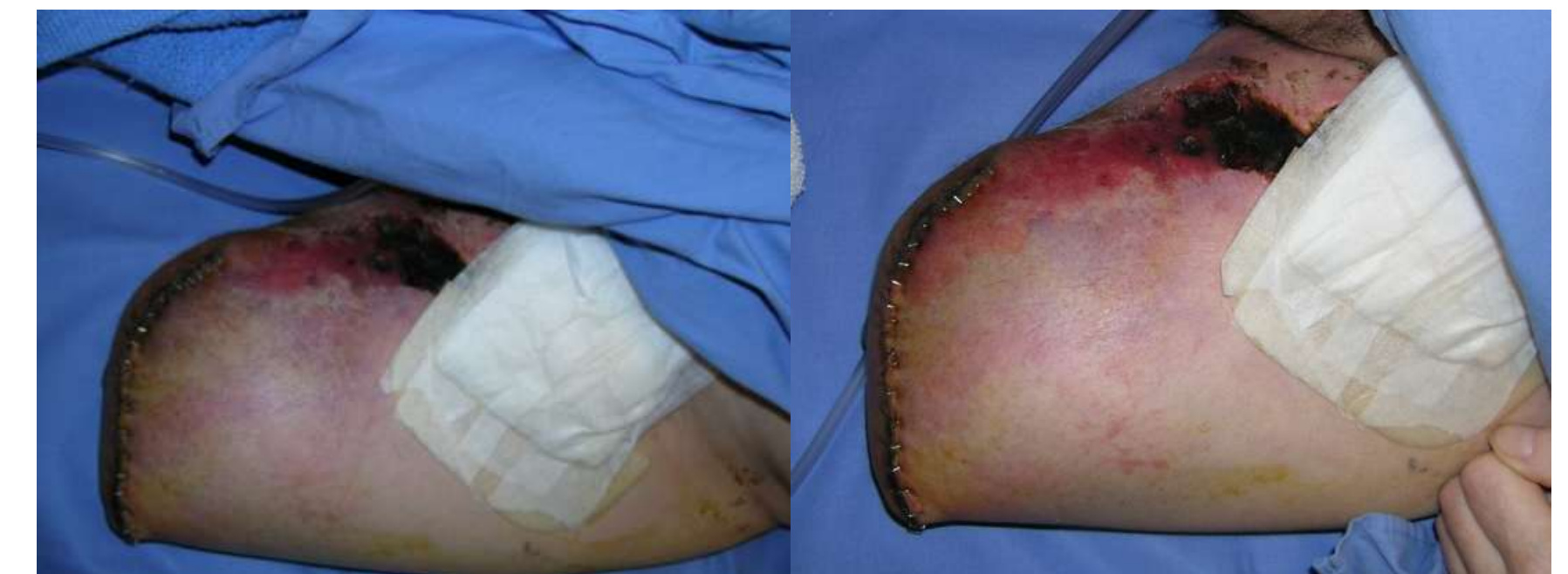


Figure 1. Left panel shows ischemic stump prior to HBO treatment, right panel shows stump immediately after HBO treatment.

## SUMMARY / CONCLUSIONS

Failed amputations in individuals with significant vascular disease carry a significant risk of mortality and wound complications. Although published studies on hip disarticulations in patients with failed amputations are old (early 1990s), they show mortality rates of 40-50%. Also, in these series, patients were rarely able to use a prosthesis if treatment was successful.

This is a small, uncontrolled, case series, which limits the conclusions that can be drawn about the use of HBO in these cases. Nevertheless, these particular patients were facing debilitating, disfiguring, and life threatening surgery with a great chance of failure. In this respect, the results were striking, unexpected, and potentially life and limb saving. HBO can both relieve hypoxia and promote wound healing in hypoxic wounds and so in cases like these, the addition of HBO may avert further surgery, improve survival, allow the patients to leave the hospital, and use a prosthesis. Additional and larger case series are needed to confirm these results.