Local heat preconditioning to prevent wound breakdown and skin necrosis: A translational study


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Disclosures

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The clinical problem

Ischaemically challenged tissue

Wound breakdown: up to 39% ¹
Skin flap necrosis: up to 54% ²

Surgical delay

[ Reinisch JF: Plast Reconstr Surg, 1974 ]
### Surgical delay

[ Reinisch JF: Plast Reconstr Surg, 1974 ]

Invasive and time-consuming
Tissue preconditioning as alternative

Application of supraphysiologic stress to tissue prior to surgery

- Maintenance of microcirculation
- Increase of ischaemic tolerance of the tissue
Tissue preconditioning as alternative

• “True” preconditioning (PC)
  - Ischaemic
  - “Remote” ischemic
    [ Przyklenk K et al: Circulation, 1993 ]

• Systemic pharmacological PC
  - Monophosphoryl Lipid A
    [ Harder Y et al: Anesth & Analg, 2005 ]
  - Erythropoietin
    [ Harder Y et al: Surgery, 2009 ]
  - Ghrelin

• Local physical PC
  - Shock-wave
  - Cooling
    [ Yunoki M et al: J Neurosurg, 2002 ]
  - Heat
Study aim

Effectiveness of repetitive local heat preconditioning

Incidence of

- Wound break down
- Skin flap necrosis
Methods

1. Skin Sparing Mastectomy and immediate breast reconstruction
   - 25 patients:
     Local heat preconditioning
   - 25 patients:
     No preconditioning (control)

2. Reduction Mammaplasty (RMP)
   - 15 patients:
     Local heat preconditioning of one breast
     No preconditioning of the other breast (control)
Methods

[ Hilotherm GmbH, Deutschland ]
Methods

PC initiated 18 hours prior to surgery

Perfusion measurements

Skin flap necrosis? Wound breakdown?

43° C  43° C  43° C
30'      30'      30'
Mastectomy / Breast reduction

14 days
Results. Overall

- No burns were noticed
- Heat-induced hyperaemia completely vanished prior to surgery
Results: Skin Sparing Mastectomy

Skin perfusion

1 hour after mastectomy
un-preconditioned

1 hour after mastectomy
preconditioned

Results: Skin Sparing Mastectomy

Skin flap necrosis


Mean \( *p < 0.05 \) vs. control
Results: Skin Sparing Mastectomy

Length of hospital stay

Mean ± SD  *p < 0.05 vs. control

Results: Reduction Mammaplasty

Wound breakdown

[ Bar chart showing wound breakdown with percentages for Control and Heat PC groups. ]
Results: Reduction Mammaplasty

Wound drainage

[ ml/24hrs ]

Mean ± SD
Summary

Local heat preconditioning

- Can be translated into daily clinical surgery
- Increases perfusion in ischaemically challenged tissue
- Significantly decreases skin flap necrosis
- Reduces wound breakdown
- Reduces length of hospital stay
- Does not increase postoperative drainage
Conclusions

Local heat preconditioning in specific breast procedures

• Safe
• Simple
• Efficient
• Applicable briefly prior to surgery
• Cost-effective
Perspectives

To tighten loose skin after weight loss, focus on **LOCAL HEAT!!!**