

Title : GLUCOSE CONTROL IN NORMAL AND OBESE SURGICAL PATIENTS

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**Introduction.** Strict intraoperative control of blood glucose in surgical patients is advantageous since hyperglycemia produces impaired, neutrophilic phagocytosis and wound healing,<sup>1</sup> while inadequate glucose availability produces lipolysis, secondarily resulting in increased myocardial oxygen demands.<sup>2</sup> Obese individuals have defective insulin effects and may therefore be intolerant of rapid glucose infusions.<sup>3</sup> We sought to determine: 1) if obese patients have less tolerance to rapid intraoperative glucose infusions than do normal weight individuals, and 2) if limiting glucose administration intraoperatively permits strict control of blood glucose in both normal and obese surgical patients without stimulating lipolysis.

**Methods.** Simultaneous determinations of blood glucose and serum glycerol were made in 19 patients, 9 normal weight - Group I, and 10 obese (>20% above ideal body weight, Metropolitan Life Tables) - Group II, undergoing elective surgery. All patients consented to a Human Use Committee approved protocol. All patients received D<sub>5</sub>LR at 2ml/kg/hr pre- and postoperatively. One half the patients in each group received D<sub>5</sub>LR intraoperatively at 2ml/kg/hr and one half at 10ml/kg/hr. Supplemental plain LR was administered as required. Following a morphine, diazepam, and atropine premed, anesthesia was induced with thiopental and maintained with 1-2% halothane and 60% N<sub>2</sub>O in O<sub>2</sub>. Ten venous blood samples were obtained with samples 1 and 10 obtained on the afternoons of the pre- and postoperative days, respectively, and samples 2 through 9 obtained on the day of surgery, as illustrated in Fig 1. Samples 5-8 were obtained 15, 30, 60, and 120 min after incision, and sample 9 at 60 min postoperatively. Blood glucose was determined by a glucose oxidase assay and serum glycerol by a microfluorometric enzymatic assay. Statistical significance was determined using Student's t test for unpaired data.

**Results.** Circulating blood glucose values in each subgroup are illustrated in Fig 1. Normal and obese patients receiving the higher intraoperative glucose load (D<sub>5</sub>LR at 10ml/kg/hr) had significantly greater glucose levels compared to similar patients receiving D<sub>5</sub>LR at 2ml/kg/hr (\*, Fig 1). Obese patients demonstrated significantly greater glucose intolerance to the higher intraoperative glucose load (+, Fig 1). Limiting glucose infusion to 2ml/kg/hr D<sub>5</sub>LR produced no increase in circulating glycerol levels intraoperatively in either obese or normal weight individuals, when compared to similar groups receiving the higher glucose load.

**Discussion.** Fig 1 demonstrates that strict intraoperative control of blood glucose (100-140mg/dl) may be accomplished in both normal weight and obese patients by limiting glucose administration to 2ml/kg/hr D<sub>5</sub>LR. Obese individuals demonstrate greater intolerance to rapid glucose administration which may be explained by their lack of insulin effectiveness.<sup>3</sup> The failure of glucose restriction to increase glycerol levels in either normal or obese patients compared to similar patients receiving greater glucose loads implies that this degree of glucose restriction does not result in inadequate glucose availability. Thus, by limiting the intraoperative infusion of 5% dextrose containing solutions to 2ml/kg/hr in both obese and normal subjects, the advantages of strict glucose control may be obtained while avoiding substrate changes indicative of starvation.

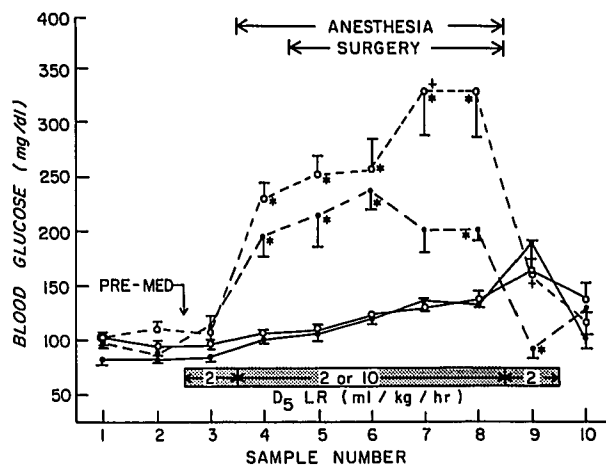


Fig 1. Blood glucose values (mean  $\pm$  SE) in obese and normal patients receiving intraoperative glucose infusion at 2 different rates. (●—●) normal weight - D<sub>5</sub>LR at 2ml/kg/hr (●---●) normal weight - D<sub>5</sub>LR at 10ml/kg/hr (○—○) obese - D<sub>5</sub>LR at 2ml/kg/hr (○---○) obese - D<sub>5</sub>LR at 10ml/kg/hr \* and + indicate  $p < .05$ , see Results.

#### References.

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