

SERUM ENZYMES AFTER HIP JOINT SURGERY

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The effect of hip joint surgery on routine serum enzyme values was studied. The increase in creatine kinase was most marked and normal levels were restored again after approximately 1 week. Asparatate aminotransferase was slightly elevated throughout the first two postoperative weeks. Alanine aminotransferase was essentially unchanged during the first three postoperative days in contrast to lactate dehydrogenase which reached pre-operative values again after only 2-3 days. Alkaline phosphatase showed an increase after 1 week whereas S-amylase was essentially normal throughout the 2 weeks studied.

Key words: hip joint surgery; serum alkaline phosphatase; serum lactate dehydrogenase; serum transaminase

Accepted 3.v.79

Skeletal muscles are rich in creatine kinase (CK), asparatate aminotransferase (ASAT) and alanine aminotransferase (ALAT), lactate dehydrogenase (LD) and alkaline phosphatase (ALP). A major enzyme in bone tissue is ALP whereas the erythrocytes contain large amounts of LD. Damage to various tissues causes an increase in the serum enzyme values which may conceal pathological elevations due to postoperative complications such as myocardial infarction and hepatic affections. Thus it was of interest to study the enzyme time-course and levels in patients undergoing hip joint surgery where there is massive tissue damage.

PATIENTS AND METHODS

Fourteen patients, seven men and seven women, median age 60 years (range 30-75), who had epidural blockade during hip joint plastic surgery were investigated preoperatively, immediately after operation and 1, 2, 3, 7 and 14 days

postoperatively as regards the following serum enzymes: S-CK, S-ASAT, S-ALAT, S-LD, S-ALP and S-amylase (The Committee on Enzymes of the Scandinavian Society for Clinical Chemistry and Clinical Physiology 1974, 1978, Ceska et al. 1969). No per- or postoperative complications were noted.

All patients were given antibiotics (Cefalosporin) from the start of the operation; seven patients were sprayed peroperatively and intermittently in the wound whereas seven patients initially received intravenous and after that peroral treatment for 1 week.

RESULTS AND DISCUSSION

With the exception of the S-LD values, 2 and 3 days postoperatively, all values from the two groups with different types of antibiotic therapy have been pooled (Figure 1).

S-CK increased from a preoperative value of 1.1 $\mu\text{kat}/1$ (range 0.6-1.5) to a highest mean value of 6.7 $\mu\text{kat}/1$ (range 2.7-12.4) 1 day postoperatively. One week after the

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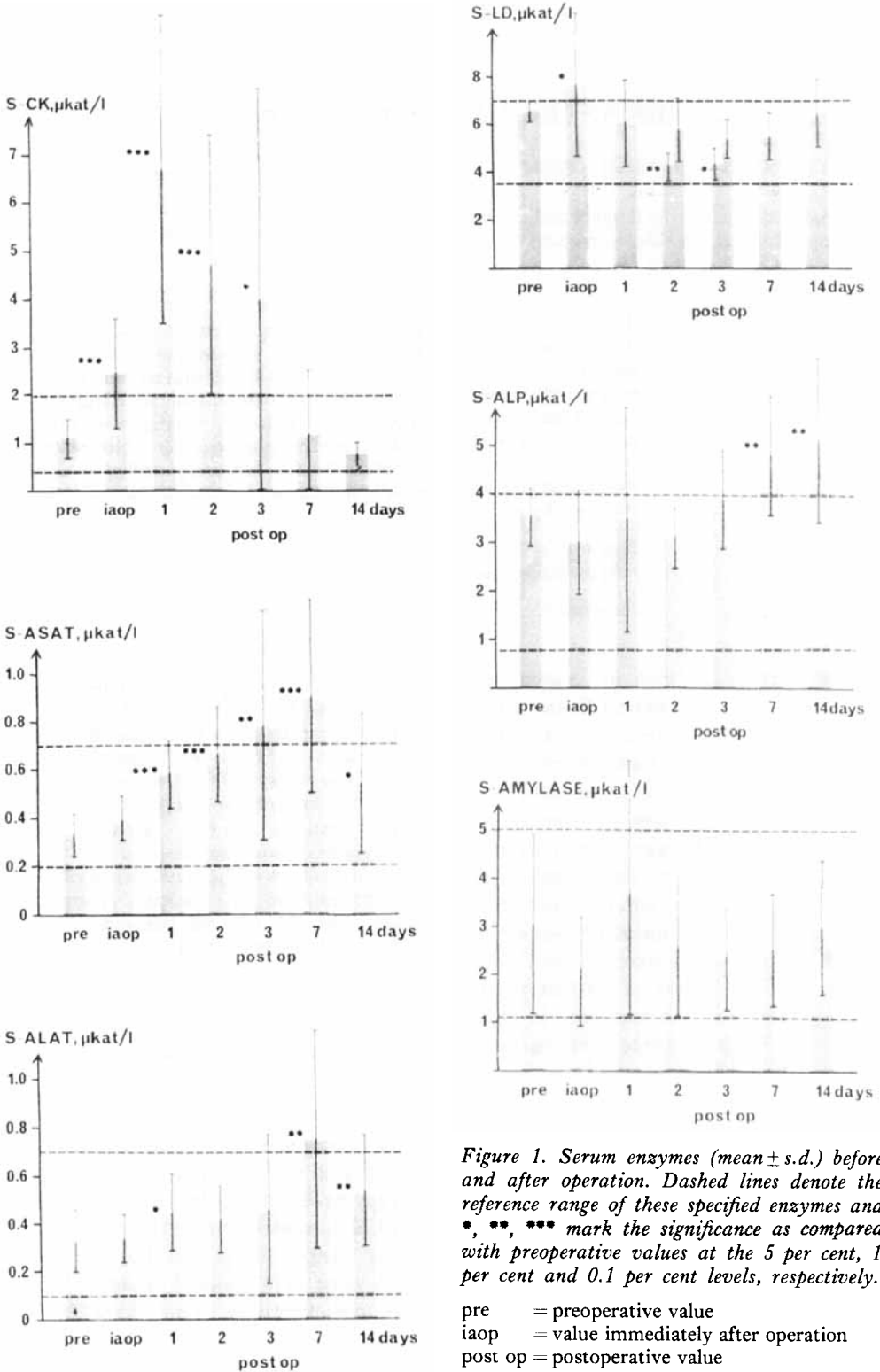


Figure 1. Serum enzymes (mean \pm s.d.) before and after operation. Dashed lines denote the reference range of these specified enzymes and *, **, *** mark the significance as compared with preoperative values at the 5 per cent, 1 per cent and 0.1 per cent levels, respectively.

pre = preoperative value
 iaop = value immediately after operation
 post op = postoperative value

operation the mean S-CK value was within the reference range.

S-ASAT increased continuously from 0.33 $\mu\text{kat}/1$ (range 0.20–0.40) preoperatively to 0.90 $\mu\text{kat}/1$ (range 0.4–1.75) after 1 week. Two weeks after operation the mean S-ASAT value remained higher than before the operation.

S-ALAT, preoperative mean value 0.33 $\mu\text{kat}/1$ (range 0.15–0.62), was fairly constant during the first 3 postoperative days; the maximum mean value 0.75 $\mu\text{kat}/1$ (range 0.2–1.75) was noted after 7 days. Furthermore, normalization of the S-ALAT mean value was not registered after 2 weeks.

S-LD increased slightly from a preoperative value of 5.8 $\mu\text{kat}/1$ (range 4.6–7.6) to 7.7 $\mu\text{kat}/1$ (range 3.4–13.0) immediately after operation. Two and three days after operation the patients with peroperative antibiotic therapy had lower S-LD values than the group of patients with oral antibiotic therapy and the patients' S-LD values were also lower than their own preoperative values.

S-ALP, preoperative mean value 3.6 $\mu\text{kat}/1$ (range 2.1–6.1), was almost constant during the first three postoperative days. After that S-ALP increased to a mean value of 5.2 $\mu\text{kat}/1$ (range 2.1–8.8) 14 days postoperatively. S-amylase, preoperative mean value 3.0 $\mu\text{kat}/1$ (range 1.1–6.8), showed no significant change during the postoperative period investigated.

For further data concerning the enzymes see Figure 1.

The postoperative serum enzyme values reflect the contents of enzymes in skeletal muscle (Schmidt & Schmidt 1960) and the contribution from other tissues such as bone and erythrocytes seems less pronounced. The increase in the serum enzymes is, however, modest in consideration of the massive skeletal muscle and bone tissue damage, in combination with a varying degree of hemolysis due to hematomas within the wound.

REFERENCES

- The Committee on Enzymes of the Scandinavian Society for Clinical Chemistry and Clinical Physiology (1978) Revised recommended method for the determination of creatine kinase in blood. *Scand. J. clin. Lab. Invest.* (In press).
- The Committee on Enzymes of the Scandinavian Society for Clinical Chemistry and Clinical Physiology (1974) Recommended methods for the determination of four enzymes in blood. *Scand. J. clin. Lab. Invest.* **33**, 291–306.
- Ceska, M., Birath, K. & Brown, B. (1969) A new and rapid method for the clinical determination of α -amylase activities in human serum and urine. *Clin. chim. Acta.* **26**, 437–444.
- Schmidt, E. & Schmidt, F. W. (1960) Originalien Enzymmuster menschlicher Gewebe. *Klin. Wschr.* **38**, 957–962.

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