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Serum Half Life of Prostatic Acid Phosphatase

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Summary. Traumatic manipulation of the prostate can cause elevated prostatic acid phosphatase (PAP) values. To avoid falsely elevated PAP values after prostatic trauma we studied the serum half life of PAP and the time taken to return to preoperative levels in patients undergoing transurethral resection (TUR-P). Although we observed a broad variation in peak PAP values the half life of PAP is fairly constant at about 1.1–2.6 h. Preoperative values were reached within 30 h. We conclude that PAP determinations can safely be carried out 30 h after prostatic trauma without any risk of falsely elevated PAP values.

Key words: Prostatic trauma, Elevated PAP levels, Serum half life of PAP

Introduction

The measurement of PAP is a useful parameter in the diagnosis and treatment of prostatic carcinoma. Prostatic manipulation can cause elevations of serum PAP after rectal examination [5], massage [3, 6, 10, 11], cystoscopy [8] and TUR-P [4]. Usually the need for a PAP measurement only becomes apparent after such examinations. To determine when PAP may be reliably measured after manipulation we studied the serum half life and the duration of elevated PAP levels after TUR-P.

Materials and Methods

Quantification of PAP was carried out before, during and after TUR-P in 6 patients with benign prostatic hyperplasia. The patients' ages ranged between 66 and 85 years. Blood was drawn from a central venous catheter into a vacutainer without additives. The samples were immediately stored at −4 °C. When sampling was completed serum was separated with SUR-SEP (General Diagnostics) and centrifuged. The serum was frozen at −20 °C and later analysed by radioimmunoassay (RIA) (Clinical Assays, Travenol) [2]. Samples from one patient were also analysed using an enzymatic test with Thymolphthalein monophosphate as substrate [7]. To calculate the half life of the elimination of PAP we used a Hewlett Packard HP 85 desktop computer with the G-PHARM pharmacokinetic program developed by Gomeni and Gomeni [1]. Since the process of the release of PAP into the circulation is mathematically ill-defined, only the log-linear part of the serum concentration time curves were used to calculate the half lives. The resections took between 45 and 90 min, the amount of tissue resected between 15 and 50 grams.

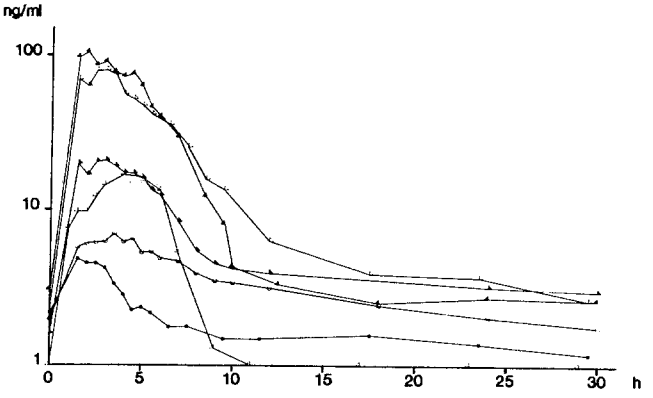

Fig. 1. PAP serum concentration curves following TUR-P in 6 patients

Results

Elimination curves for PAP are shown in Fig. 1. PAP concentrations prior to the resection were within normal range. Peak values were reached between 1.5 and 4 h (mean 2.9 h) from the start of the resection. The calculated serum half life of PAP was 1.93 ± 0.16 h. There was no evidence of a second superimposed elimination curve. In Fig. 2 the PAP measurements are shown in one patient in whom it was determined by both RIA and the enzymatic method. The curves obtained with the RIA and the enzymatic activity measurement of PAP were parallel. In 5 patients PAP returned to preoperative levels within 30 h after the begin-

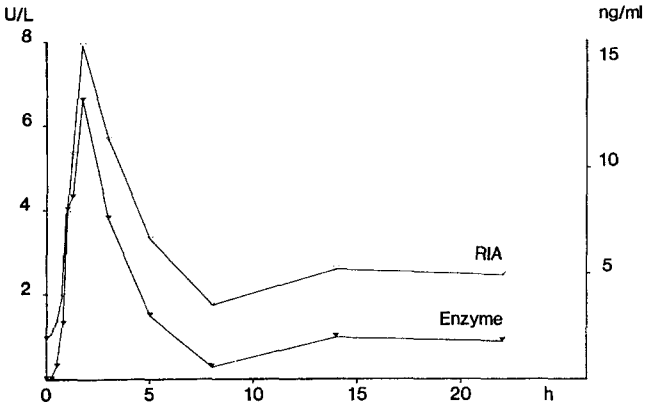

Fig. 2. PAP serum concentration determined by RIA and an enzymatic method following TUR-P in one patient

Table 1. PAP max duration of operation and amount of tissue resected for each patient

No.	PAP max	Duration of operation	Amount of tissue resected
1	109.8 ng/ml	90 min	28 g
2	81.4 ng/ml	60 min	17 g
3	22.0 ng/ml	90 min	35 g
4	17.1 ng/ml	45 min	50 g
5	7.1 ng/ml	60 min	20 g
6	4.9 ng/ml	75 min	15 g

ning of the resection. Table 1 lists the peak PAP values, the duration of operation and the amount of tissue resected for each patient. The peak value could not be correlated to the amount of tissue resected nor to the duration of operation.

Discussion

Different types of prostatic manipulation are known to cause elevated serum PAP levels. The rise seems to parallel the degree of "trauma" to prostatic tissue. The details of secretion into the circulation and elimination of PAP are not clear. We have chosen the TUR-P as a model to study the elevation and elimination of PAP after prostatic trauma. There was a large variation in the peak PAP levels; 4.9–109.8 ng/ml. This did not correlate to the amount of tissue resected nor to the duration of the resection. This indicates that there is a broad range in the amount of PAP in prostatic tissue. The peak level of PAP concentration was reached between 1.5 and 4 h after the beginning of the resection. Possible explanations for this somewhat surprising finding could be postoperative hyperaemia or a continuing necrosis and cytolysis of the prostate after the resection. The fact that the enzymatic and the RIA curves exactly parallel each other indicates that we measured *prostatic* acid phosphatase. The serum half life of PAP is 1.9 ± 0.6 h which correlates well with the half life found by Vihko et al. [9] although we had no evidence of a second half life. The elevation of PAP after prostatic trauma returns to pretraumatic values within 30 h, from which time on PAP estimations can be reliably resumed.

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