Lesson of the Week

Rectal examination and acid phosphatase: evidence for persistence of a myth

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In 1938 Gutman and Gutman¹ reported raised serum concentrations of acid phosphatase in patients with metastatic carcinoma of the prostate. These serum concentrations were reported also to be raised by prostatic manipulations,²⁻³ and in particular by rectal examination with or without massage of the prostate.⁴⁻⁶ As a result, medical students have been taught for a long time that blood should not be taken for estimation of enzyme activity for 24 hours after a rectal examination.

In the past 10 years, however, there has been a wealth of convincing evidence that rectal examination did not raise the enzyme activity in the absence of carcinoma.²⁻⁷⁻¹¹ We have recently surveyed hospital doctors' beliefs on this topic and carried out yet another study of the serum enzyme activity before and after rectal examination.

Methods

The questionnaire asked two questions: is it necessary to delay taking blood for acid phosphatase estimation after rectal examination of the prostate? (Yes, No, Don't know); and if yes, for how long? (up to 1 hour, 1-12 h, 12-24 h, 24-48 h, or up to 1 week). These questions were sent by internal mail to 210 hospital doctors of all grades and specialties at two large district hospitals in the south of England and at a university teaching hospital in the north of England. The replies were anonymous, a code having been included that identified only the hospital grading and whether the responder was "medical" or "surgical."

Thirty-six patients with no known prostatic disease admitted to a general surgical ward gave informed consent to be included in the study. Seven-10 ml of blood was drawn from a suitable arm vein five minutes before a routine digital rectal examination during which the prostate was carefully palpated but not massaged. The examination, which was made as uniform as possible, lasted about 30 seconds. Blood samples were drawn at 5 minutes, 1 hour, and 24 hours after the rectal examination. The blood was transferred to a plain universal container.¹² The serum was separated immediately and stored at -20°C . The assays were performed within one week and all the four specimens from each patient were analysed in the same batch.

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Pathological aphorisms such as "rectal examination causes a rise in acid phosphatase" are taught to medical students long after they have been disproved by clinical research

Total (TAP) and tartrate-inhibited (=prostatic fraction, PF) acid phosphatase activity was determined by the method of Richterich *et al*,¹³ using *p*-nitrophenylphosphate as substrate (Roche, Diagnostica). The method depends on the hydrolysis of *p*-nitrophenylphosphate to phosphoric acid and *p*-nitrophenol, the latter being measured photometrically at 410 nm. Versatol Hi (General Diagnostics) and Precipath Elevated (Boehringer) were used as controls. In our laboratory the normal values for TAP and PF are 4.5 to 13.4 and <3.5 IU/l respectively.

FIG 1—Delay thought necessary before blood could be taken for acid phosphatase estimation after rectal examination.

Results

Out of a total of 210 questionnaires sent out, 150 replies were received—a response rate of 71%. There was no significant difference in the responses between the three different hospitals (data not shown). Overall, 69% of responders believed taking blood for acid phosphatase estimation needed to be delayed

after rectal examination of the prostate ("positive responders"). A further 17% did not know the answer, and only 16% believed that the delay was not necessary. The highest incidence of positive responders was among the most junior hospital doctors (79% among medical, and 82% among surgical senior house officers and house officers).

Fig 1 shows the time interval believed to be necessary by the positive responders before blood can be taken for acid phosphatase determination after rectal examination of the prostate. Forty-six per cent would wait for between 24 and 48 hours, and 33% up to one week. Only 12% believed a delay of 12-24 hours was adequate, and 7% did not know.

Fig 2 shows that there was no significant change in the concentrations of acid phosphatase after rectal examination of the benign prostate. In only one instance did the PF rise to above 3.5 IU/l. This was in a 75-year-old man admitted for

FIG 2—Serum concentrations of tartrate-inhibited acid phosphatase (mean $\pm$ SEM). NS=no significant difference between pre-examination mean and means at indicated intervals after rectal examination.

repair of an inguinal hernia. He had moderate benign prostatic hypertrophy on rectal examination. His pre-examination PF level at 3 IU/l was the highest recorded of all the 36 patients and his post-examination levels were 3.3, 4.0, and 3.1 IU/l at 5 minutes, 1 hour, and 24 hours respectively. In view of his age, however, and the high initial acid phosphatase level, the possibility of occult carcinoma of the prostate cannot be excluded.

Discussion

The value of acid phosphatase estimations in managing carcinoma of the prostate has been discussed in detail¹²⁻¹⁴ and is beyond the scope of this discussion. Several early reports suggested that the serum enzyme activity rose after rectal examination. Daniel and van Zyl¹⁵ found raised concentrations in three out of 24 patients with benign prostatic hypertrophy. Hock and Tessier⁶ studied 20 patients before and after prostatic massage, and found raised concentrations in eight, but some had prostatitis. On the basis of this, they recommended drawing blood before rectal examination or after an interval of 24 hours.

The acid phosphatase concentration has also been shown to rise after prostatic infarction¹⁵ and after manipulations that

breach the substance of the gland, such as transurethral resection² or transrectal needle biopsy of the prostate.³ The long-held belief that serum acid phosphatase concentrations rise after rectal examination of the benign prostate has now been strongly challenged, however. Wiederhorn and Pickens⁸ have shown that in 59 patients, 11 of whom had benign hyperplasia, prostatic massage failed to yield raised concentrations. Christensen and Nielsen⁷ studied 40 patients with benign hyperplasia and 21 with normal prostates and found no single rise of either the total acid phosphatase or the tartrate-inhibited fraction after diagnostic palpation of the prostate; and Greene and Thompson² also failed to show a rise in 19 patients, 14 of whom had vigorous prostatic massage. Several recent British studies,⁹⁻¹¹ and this study, all confirm that there is no rise in serum acid phosphatase concentrations after rectal examination of the benign gland.

This evidence has been published in general and specialist journals on both sides of the Atlantic and should have reached all medical teachers. Yet the response to our questionnaire indicates strongly that most young doctors still believe they should delay taking blood for the enzyme determination after rectal examination of the prostate. How should such misconceptions be eradicated from the corpus of medical teaching?

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Correction

Stilboestrol during pregnancy

The answer to this Any Question? (28 March 1981, p 1051) should state that "the risk of clear-cell adenocarcinoma of the vagina is about 0.14-1.14 per 1000 stilboestrol-exposed girls."