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Volume Change of the Prostate and Seminal Vesicles in Male Hypogonadism after Androgen Replacement Therapy

I. SASAGAWA, T. NAKADA, T. KAZAMA, S. SATOMI, T. TERADA, T. KATAYAMA

Department of Urology, Faculty of Medicine, Toyama Medical and Pharmaceutical University, Toyama; Department of Urology, Chiba University, School of Medicine, Chiba, Japan

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Before and after androgen replacement therapy prostatic and seminovesicular volume was estimated by means of transrectal ultrasonography in 13 hypogonadal men. Volume of the prostate ($p < 0.001$) and seminal vesicles ($p < 0.01$) significantly increased after treatment with testosterone enanthate. However, the plasma level of testosterone remained abnormally low. These results indicate that volume determination of the prostate and seminal vesicles by means of transrectal ultrasonography is suitable for evaluating the adequacy of androgen replacement therapy in male hypogonadism.

Introduction

Androgen replacement therapy is widely applied to the patients with male hypogonadism. Treatment of male hypogonadism appears best accomplished by intramuscular injection of long acting esters of testosterone such as cyclopentylpropionate or enanthate [4]. In these patients, androgen replacement therapy occasionally brings the volume of ejaculates and other sexual characteristics back to normal [1, 10]. However, the effects of androgen replacement therapy on the prostate and seminal vesicles have not been reported. In the present study, we describe the influence of androgen replacement therapy on prostatic and seminovesicular volume, which was determined by means of transrectal ultrasonography in male hypogonadism.

Materials and methods

Thirteen males with primary hypogonadism, aged 25–32 years (median 25 years), were included in the study. The apparent causes of primary hypogonadism were Klinefelter's syndrome (as diagnosed by a 47,XXY peripheral lymphocyte karyotype) in 8 and 46,XYq deletion in 1. No aetiology was found in 4 of the subjects.

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All patients were treated with intramuscular injections of testosterone enanthate (Enarmon depot, Teikoku Hormone Co., Japan) 250 mg every three weeks for 66–300 weeks (median 154 weeks).

Before and after androgen replacement therapy, ultrasonic examinations were performed using an Aloka ASU-8T model (Aloka Co., Japan). The scanner consists of a 5.0 MHz transrectal transducer assembly, a radial scanner and a chair. A monitor unit (Aloka USI-82C, Aloka Co., Japan) was used for recording the tomograms. The area of prostatic and seminovesicular section on each tomo-

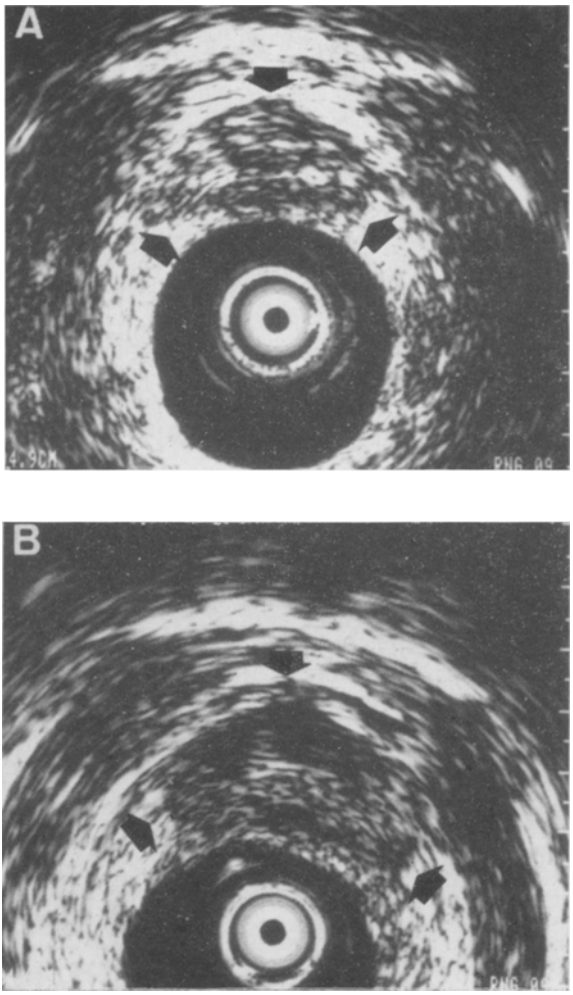

Fig. 1. (A) Transrectal scan of the prostate before androgen replacement therapy. (B) Transrectal scan of the prostate 246 weeks after androgen replacement therapy. The prostate is outlined by arrows

gram was taken at 0.5 cm intervals. The prostate and seminal vesicles were clearly outlined on the tomograms and, based upon the principle of serial planimetry, the volume can be determined [3, 9]. The range of error in the measurement of prostatic and seminovesicular size using sections 0.5 cm apart is considered to be less than 5% [8, 9]. To avoid influence of sexual activity on the determined volumes the patients were asked to refrain from ejaculation for more than 5 days before the ultrasonic examination. As a control group, the volume of the prostate

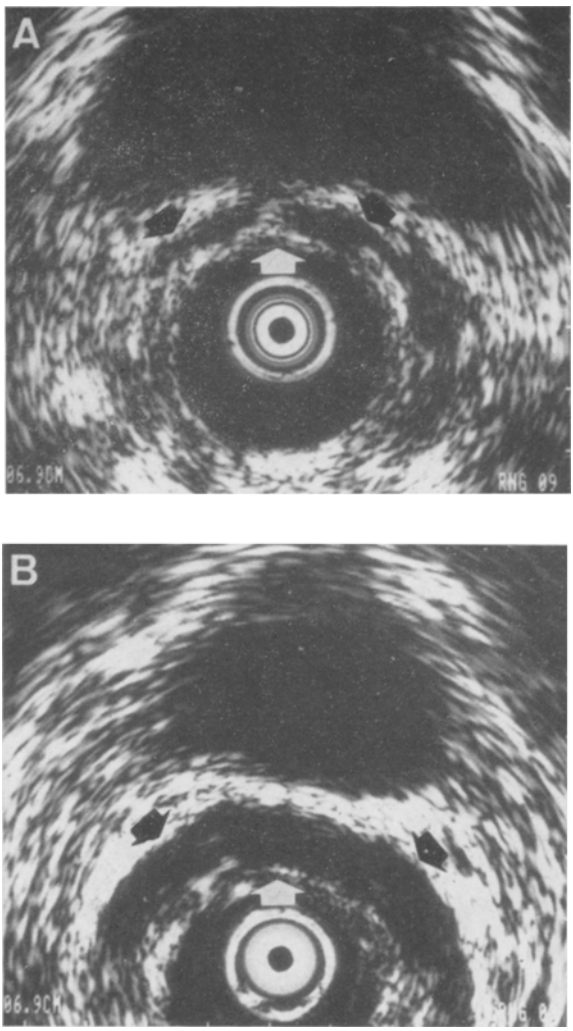

Fig. 2. (A) Transrectal scan of the seminal vesicles before treatment with testosterone enanthate. (B) Transrectal scan of the seminal vesicles 246 weeks after treatment with testosterone enanthate. Seminal vesicles are outlined by arrows

and seminal vesicles was also examined in 25 men (aged 26–38 years, median 31 years) with normospermia.

Plasma level of testosterone was measured before and after androgen replacement therapy. Blood samples were drawn immediately prior to the next injection of testosterone enanthate. Radioimmunoassay kits (Daiichi Radioisotope Laboratory, Japan) were used for the determination of testosterone. The normal range was 3.0–8.5 ng/ml.

Results

Prostatic and seminovesicular volume was small before androgen replacement therapy (Figs 1A, 2A). After treatment with testosterone enanthate the volume of the prostate and seminal vesicles increased (Figs 1B, 2B). In all patients both prostatic and seminovesicular volumes gradually increased during androgen replacement therapy (Fig. 3). As shown in Table 1, treatment with testosterone enanthate resulted in a significant enlargement of the prostate ($p < 0.001$) and seminal vesicles ($p < 0.01$). In volume of the prostate and seminal vesicles there was no significant difference between patients with male hypogonadism after androgen replacement therapy and the control group (Table 1).

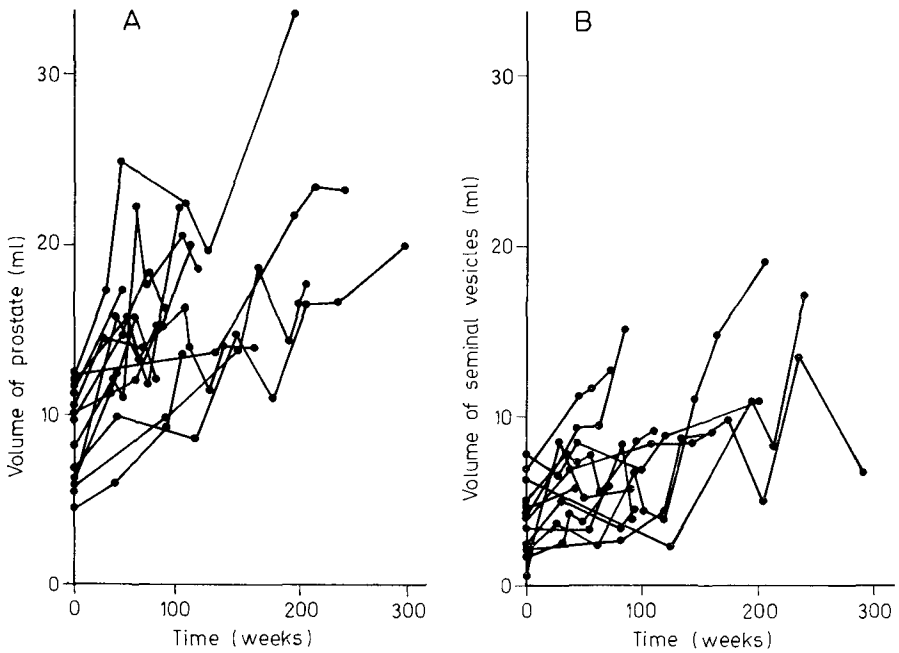

Fig. 3. Effects of androgen replacement therapy on volume of prostate (A) and seminal vesicles (B)

In 12 of the 13 patients plasma level of testosterone was abnormally low. After androgen replacement therapy the plasma testosterone level did not maintain the normal range in all patients (Fig. 4).

Table 1

Volume of the prostate and seminal vesicles before and after androgen replacement therapy

	No. of patients	Prostate[a] (ml)	Seminal vesicles[a] (ml)
Control	25	18.7 ± 5.2[b]	12.6 ± 5.1[b]
Male hypogonadism			
before	13	9.3 ± 2.9[b, c]	4.3 ± 2.3[b, d]
after	13	19.0 ± 5.2[c]	10.2 ± 4.7[d]

[a] Values are mean $\pm$ S.D.
[b] Significantly different from control: $p < 0.001$.
[c] Significantly different from before androgen replacement therapy: $p < 0.001$.
[d] Significantly different from before androgen replacement therapy: $p < 0.01$.

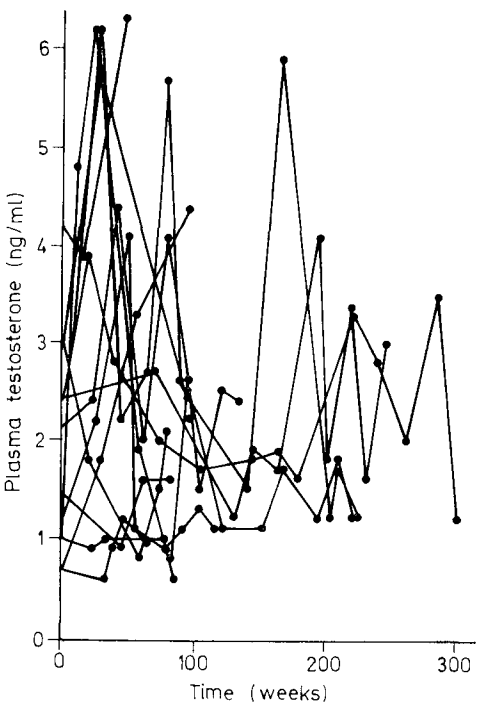

Fig. 4. Effects of androgen replacement therapy on plasma testosterone level

Discussion

It is well known that androgens play a major role in the control of normal prostatic growth and the development of prostatic hyperplasia [7]. Also, seminal vesicles are considered to depend on androgens [5]. In male hypogonadism atrophic prostate and seminal vesicles are usually observed. In our cases, too, volume of the prostate and seminal vesicles was very small and plasma testosterone levels were abnormally low. Androgen replacement therapy in male hypogonadism occasionally restores or brings back to normal the male secondary sexual characteristics and male sexual behaviour, and mimics the hormonal effects on somatic development [2, 6]. According to Wilson and Griffin [10], androgen replacement therapy brings the volume of the ejaculate, which is largely derived from the prostate and seminal vesicles, back to normal. In our cases the plasma testosterone level did not maintain the normal range. However, the intramuscular injection of 250 mg of testosterone enanthate at 3-week intervals resulted in a significant increase in prostatic and seminovesicular volume. The intramuscular administration of testosterone enanthate cannot produce the plasma level of testosterone. For evaluating the adequacy of androgen replacement therapy in male hypogonadism, volume estimation of the prostate and seminal vesicles by means of transrectal ultrasonography is considered to be more suitable than plasma testosterone level determination.

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