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## PAPERS

Oral treatment for constitutional delay of growth and puberty in boys: a  
randomised trial of an anabolic steroid or testosterone undecanoate

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Thirty three boys (mean 14.6 years old, range 12.8-16.2 years) with constitutional delay of growth and puberty were randomised into two groups to determine which form of oral treatment would give the better anthropometric response. The two drugs were administered by mouth (one tablet/day) for a mean of 3.5 months (range 3-7 months). At randomisation, 17 boys received testosterone undecanoate (40 mg/day) and 16 oxandrolone (2.5 mg/day). At the start of treatment they were prepubertal or in early puberty, their height SD score was -1.97 in boys treated with testosterone and -2.21 in those treated with xandrolone, and their growth rates were 4.3 and 4.2 cm/year respectively. Both sex steroid and anabolic steroid treatments induced a significant growth acceleration in all patients except four (three treated with testosterone and one with oxandrolone). When treated with the alternative sex steroid, all four non-responders had a significant anthropometric response. In all boys the induced growth acceleration was sustained when treatment was interrupted. There was no significant difference in the induced growth spurt and bone maturation between the two groups. Spontaneous progress into puberty was achieved in all boys with an increase in testicular volume from a mean of 4.6 to 8.5 ml. The rate of development in secondary sexual characteristics was also similar in the two groups. These data suggest that oral testosterone and oxandrolone are equally effective in the treatment of growth delay in boys with constitutional delay of growth and puberty.

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Letters to the editor

Oral testosterone undecanoate for the induction of puberty in anorchid boys

EDITOR, Testosterone undecanoate, an orally active androgen, has been in clinical use for about 20 years.<sup>1</sup> Its efficacy for the acceleration of growth has been well documented in prepubertal and early pubertal boys.<sup>2 3</sup> We wondered if it could be used for the induction of puberty in anorchia as preliminary data suggested.<sup>4</sup>

Ten anorchid patients (bilateral neonatal testicular torsion in three, congenital anorchia in seven) were treated with testosterone undecanoate. Four boys received 40 mg three times weekly. This dose was felt to be insufficient. Six boys aged 11-14 years (mean 12.0 years) received 40 mg daily for 12.5 months (range 5-20) and then 80 mg daily for another 10.2 months (range 6-15). In these six boys, pubic hair Tanner stage 2 was observed after 5.8 months (range 5-8) and Tanner stage 3 after 15.5 months (range 12-20). The time interval of 10 months for progression of pubic hair stage 2 to stage 3 is comparable with the finding in normal boys. In their longitudinal study, Largo and Prader observed that in 52% of the boys pubic hair progressed from stage 2 to stage 3 within one year.<sup>5</sup> In the first year of treatment, height velocity was 7.2 cm/year (6.0-9.0) and weight gain was 7.0 kg (5.2-8.0). Stretched penile length increased from 3.5 cm (3.0-4.0) before to 6.2 cm (5.0-8.0) at the end of treatment.

We conclude that oral testosterone undecanoate treatment in anorchid boys is simple, safe, and effective. Starting at the age of 11 to 12 years with a dose of 40 mg daily for one year and 80 mg daily for another year provides for a gentle induction of puberty with normal tempo. Life long testosterone substitution must then be continued by the intramuscular or potentially by the transdermal route.

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Plasma androgens after a single oral dose of testosterone undecanoate

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Total plasma androgens (PA) were measured in 9 hypogonadal males aged between 13 and 21 1/2 years after a single oral dose of testosterone undecanoate (TU). With the exception of one patient, all showed a rise in PA with peak values between 7.7 and 38.0 nmol/l at 2 to 7 hours. A further patient aged 15.7 years who was given an 80-mg dose had a peak PA level of 71.2 nmol/l. In all patients PA returned to basal levels at 24 hours. In 4 patients plasma testosterone and dihydrotestosterone were measured, both rose after oral TU, and relatively high plasma dihydrotestosterone values were obtained. While these results indicate that TU is effective in young people, the very high peak androgen levels found in several of them after 40 mg TU suggest that this dose may be excessive in patients in whom growth is not complete.