intravenous and oral acetazolamide, topical steroids, and mydriatics. Radiographical examination excluded any orbital fracture. Over the next 48 hours blood in the anterior chamber had cleared sufficiently to allow fundal views: there was vitreous haemorrhage in the left eye and bilateral commotio retinae. The visual acuity in the right eye returned to 6/5 within 72 hours, and re-examination showed no abnormality apart from residual traumatic mydriasis. Topical timolol was required to control persistently raised intraocular pressure in the left eye. After four weeks the visual acuity was still reduced at 6/18 with peripapillary subretinal haemorrhage, oedema at the posterior pole, and peripheral pigmentary retinal degeneration.

CASE 2

In this patient the visual acuity was reduced to 6/24 with a 2 mm hyphaema, rupture of the iris sphincter, an unreacting dilated pupil, and inferonasal commotio retinae. The right eye was not injured. The left eye was treated with topical mydriatics and steroids, and the visual acuity returned to normal within seven days. No further complications were found at the last follow up examination, but the traumatic mydriasis and associated cycloplegia persisted.

Comment

The damage inflicted by a blow to the eye depends on the kinetic energy of the blow; ocular damage is due to direct impact disrupting the anterior segment and the contra coup effect disrupting the retina. The energy on impact of solid objects such as a cricket ball or fist is dissipated over the cranial vault and facial skeleton as the blow strikes the orbital margin.² This anatomical arrangement does not protect against atmospheric and immersion blast injuries or injuries due to high velocity jets of fluid; thus directed water jets can cause serious eye injuries.

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Pulsatility of luteinising hormone in men with chronic renal failure: abnormal rather than absent

Loss of libido, impotence, infertility, oligospermia, and low testosterone concentrations are common in men with chronic renal failure treated by intermittent haemodialysis; although the cause remains uncertain, both hypothalamopituitary dysfunction and primary gonadal dysfunction have been implicated.¹ Pulsatile release of gonadotrophin releasing hormone is essential for the normal secretion of luteinising hormone. Rodger *et al* found that despite normal testosterone concentrations only one of six patients receiving intermittent haemodialysis or chronic ambulatory peritoneal dialysis showed luteinising hormone pulsatility between 6 am and 10 am.² We looked for pulses of luteinising hormone in men receiving intermittent haemodialysis.

Patients, methods, and results

Ten men (mean age 38 (range 20-59)) who had been stabilised on intermittent haemodialysis for at least six months were studied on the evening before their next dialysis. All were taking aluminium hydroxide, and some were taking cimetidine and β blockers. All had normal secondary sexual characteristics, and none had a history of hypogonadism before their renal failure. Six healthy men (mean age 33 (range 25-38)) served as controls. To assess the pulsatility of luteinising hormone blood was taken without stasis via an indwelling venous cannula at five minute intervals for three hours and then at 15 minute intervals for four hours. A basal sample was collected for estimation of serum testosterone, prolactin, follicle stimulating hormone, and 17β oestradiol concentrations.

Luteinising hormone was measured by an immunoradiometric assay (MAIACLONE Sero Diagnostics, Woking) standardised against World Health Organisation 68/40 and with an interbatch coefficient of variation of 5.9%

at 7 IU/l and 5.5% at 46 IU/l. Follicle stimulating hormone, prolactin, testosterone, and 17β oestradiol concentrations were measured by standard radioimmunoassays with reagents from the Chelsea Hospital for Women, St Bartholomew's Hospital, St Thomas's Hospital, and Steranti, St Albans, respectively. A pulse of luteinising hormone was defined as an increment in luteinising hormone concentration from nadir to peak of over 20% in two or more consecutive samples.^{2,3} Statistical analyses were performed with Student's *t* test for unpaired observations.

Mean (SEM) results of hormone assays

	Testosterone (nmol/l)	Prolactin (mIU/l)	17β Oestradiol (pmol/l)	Luteinising hormone (IU/l)	Follicle stimulating hormone (IU/l)
Patients receiving dialysis	15.6 (1.9)	514 (94)	207 (29)	14 (1.9)	9.2 (2.8)
Controls	19.0 (1.0)	140 (23)	243 (22)	4.2 (0.4)	2.2 (0.4)
Significance	NS	$p < 0.01$	NS	$p < 0.01$	NS
Normal range	10-38	< 150	< 150	3-10	0.5-6.0

Seven of the 10 patients and all six controls showed pulsatility of luteinising hormone, but the mean number of pulses during the seven hour study was lower in the patients (mean 1.0 (SEM 0.2) *v* 3.3 (0.5) pulses, $p < 0.001$). The mean serum testosterone concentration was lower in the patients than in the controls but not significantly so (table). Mean serum prolactin and luteinising hormone concentrations were significantly greater in the patients, but in only one was the prolactin concentration greater than 1000 mIU/l. There was no significant difference in mean serum oestradiol or follicle stimulating hormone concentration between the patients and the controls. In three patients, however, serum follicle stimulating hormone concentration was greater than 20 IU/l. There was no significant difference in mean ages between the groups.

Comment

In normal men luteinising hormone is released in pulses, the largest of which have a periodicity of 90-120 minutes.³ Although loss of pulsatility results in hypogonadotrophic hypogonadism with concentrations of testosterone similar to those after castration,⁴ Rodger *et al* reported that five out of six patients receiving dialysis showed no pulsatility of luteinising hormone but had normal serum concentrations of testosterone.² In contrast, in our study, with the same criteria for pulsatility but more frequent sampling and a more sensitive and precise assay, most of the patients receiving intermittent haemodialysis had pulsatile secretion of luteinising hormone. This might explain the maintenance of normal or borderline low serum total testosterone concentrations found in our study and by others.^{1,2} The large pulses were, however, less frequent than those in the normal control subjects, and this might contribute to the reported low serum free testosterone concentration and defects in spermatogenesis during intermittent haemodialysis.¹ Pulses of smaller amplitude may also be present, but as these would not be detected by the conventional method of identifying pulses used in this study further investigations are in progress using spectral and periodic regression analysis.

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