

Background

- The functional capacity of the testes in prepubertal boys with cryptorchidism before treatment has received very little attention.
- The assessment of testicular function at diagnosis could be helpful in the understanding of the pathophysiology of cryptorchidism and in the evaluation of the effect of treatment.
- Anti-Müllerian hormone (AMH) is a well-accepted Sertoli cell biomarker to evaluate testicular function during childhood without the need for stimulation tests.

Aim of the Study

To assess testicular function in prepubertal children with cryptorchidism before orchiopexy, by determining serum AMH.

We also evaluated serum gonadotropins and testosterone and looked for associations between testicular function and the clinical characteristics of cryptorchidism.

Methods

Design: Retrospective, cross-sectional, analytical study. All clinical charts of patients admitted at the outpatient clinic (years 2000 to 2017) and recorded in our database with the diagnosis of cryptorchidism, were eligible.

Main outcome measure: Serum concentration of AMH (EIA AMH/MIS®, Beckman-Coulter Co).

Secondary outcome measures: Serum LH, FSH and testosterone.

For comparison, serum hormone levels from a normal population of 179 apparently normal prepubertal boys were used.

Inclusion criteria: Normal virilisation and assessment at prepubertal age and before orchiopexy.

Exclusion criteria: Patients with other known disorders affecting the gonadal axis

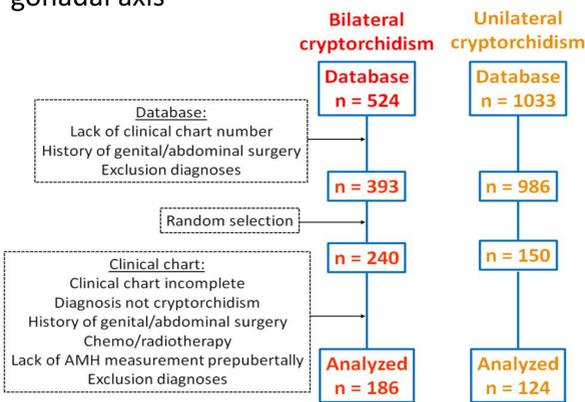
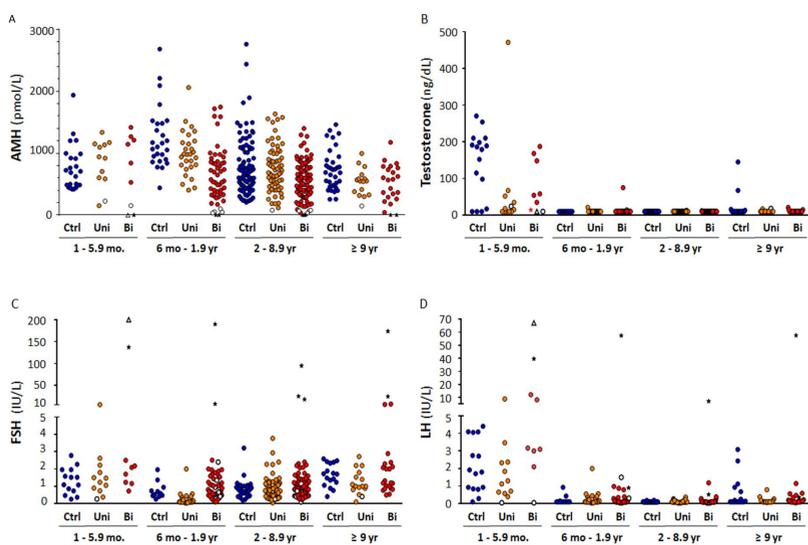


Fig.1 Flow-chart of patient inclusion in the study.

After sample size calculation, random samples of **124** of 1033 patients with unilateral cryptorchidism and **186** of 524 patients with bilateral cryptorchidism available in our database were analysed.

Results

Fig. 2 Hormone serum levels in cryptorchid boys



Empty circles indicate cryptorchid boys with micropenis, stars indicate anorchid boys, and triangles indicate anorchid boys with micropenis. Ctrl: normal controls; Uni: unilateral cryptorchidism; Bi: bilateral cryptorchidism.

Fig. 3 Serum levels of AMH, expressed as standard deviation score (SDS) for age, in patients with unilateral or bilateral cryptorchidism. Bars indicate medians and interquartile ranges

Median AMH SDS was below 0 in both the bilaterally (Wilcoxon signed rank test, $P < 0.0001$) and the unilaterally ($P = 0.0052$) cryptorchid groups.

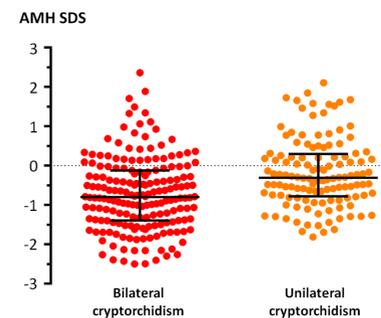


Fig. 4 Prevalence of abnormal AMH (levels <3rd percentile) in cryptorchid boys

The prevalence of AMH below the normal range was greater in patients with bilateral cryptorchidism than in boys with unilateral cryptorchidism aged 6 months - 1.9 yr and in boys aged 2 - 8.9 yr (Fisher's exact test).

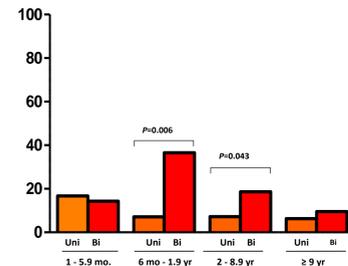


Table 1. Logistic regression performed to identify potential risk factors for hypogonadism (AMH levels <3rd percentile) in boys with cryptorchidism (unilateral and bilateral).

	Odds Ratio	95% CI	P*
Bilateral cryptorchidism	3.61	1.56-8.39	0.003
Micropenis	92.79	11.29-762.65	<0.001
Hernia	1.41	0.60-3.27	0.430
Pre-term	1.02	0.32-3.22	0.979
Birth weight	0.99	0.99-1.00	0.682
Age at evaluation	0.96	0.86-1.07	0.470

* Fisher's exact test. CI: confidence interval

Fig. 5 Serum levels of AMH (SDS for age), before and after orchidopexy in patients with cryptorchidism (unilateral or bilateral).

Serum AMH levels were available in 76 patients before and after surgery. A statistically significant increase was observed in AMH levels after orchidopexy (Paired t test).

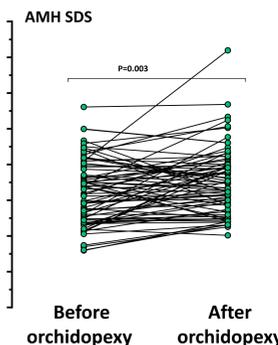


Fig. 6 Serum levels of AMH (SDS for age), in patients who received hCG treatment for bilateral cryptorchidism. Bars indicate medians and interquartile ranges.

AMH levels of bilaterally cryptorchid boys who showed a successful response of both testes to hCG were higher than those of boys with no response (Kruskal-Wallis test followed by Dunn's Multiple Comparison test, $P = 0.0001$)

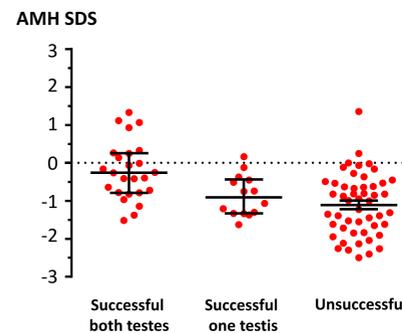


Table 2. Prevalence of abnormal gonadotrophins (>97th percentile).

	1 - 5.9 months		6 months - 1.9 yr		2 - 8.9 yr		>9 yr	
	Uni	Bi	Uni	Bi	Uni	Bi	Uni	Bi
FSH >97th centile n(%)	1 (8.3)	0	1 (3.6)	3 (5.8)	1 (1.5)	0	1 (6.3)	4 (19.1)
LH >97th centile n(%)	1 (8.3)	2 (22.2)	1 (3.6)	3 (5.8)	7 (10.6)	6 (6.7)	0	0

Conclusions

Prepubertal boys with cryptorchidism, especially those with bilaterally undescended gonads, have decreased AMH production. Although serum AMH may fall within the normal range, there is a considerable prevalence of testicular dysfunction during childhood in this frequent condition.