



# Nonpalpable testes: Ultrasound and contralateral testicular hypertrophy predict the surgical access, avoiding unnecessary laparoscopy

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## Summary

### Introduction

In up to 20% of patients presenting with undescended testes, one or both are non-palpable. Whereas the most reliable means to exclude an abdominal testis is laparoscopy, there has been a lot of debate about the role of inguinal ultrasound (US) in detecting non-palpable inguinal testis. While we do not aim to add another paper claiming the benefits of US, we wanted to determine the excess capability of US to determine the correct surgical approach – inguinal or laparoscopy. In the light of avoiding unnecessary diagnostic laparoscopies, even the cost-effectiveness raised in many current papers might be called into question.

### Patients and methods

Of a total of 684 boys who underwent surgery for undescended testes at our department between 2011 and 2014, in 58 (8.5%), one or both testes were neither palpable preoperatively nor under general anesthesia. These boys were examined by two experienced pediatric urologists clinically as well as by US. Besides the size of the contralateral testis, the presence of a testis in the inguinal channel was investigated. The additional impact of US over clinical exam and consideration of the size of the contralateral testis was assessed by means of intra-individual comparisons using Cochran-Q as well as McNemar tests.

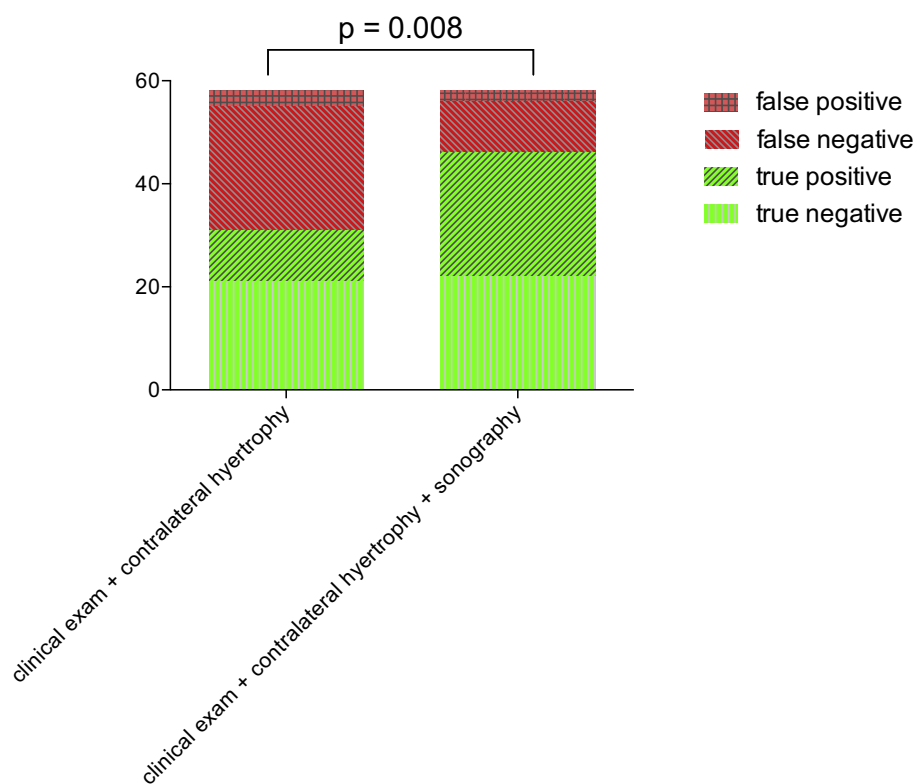
## Results

Clinical exam without considering the size of the contralateral testis had a sensitivity of 9% (95% CI 2–24%) and a specificity of 100% (95% CI 86–100%) to accurately predict the surgical approach deemed appropriate postoperatively. The consideration of the size of the contralateral testis – taken as an isolated factor – accurately predicted the surgical approach with a sensitivity of 21% (95% CI 9–38%) and a specificity of 88% (95% CI 68–97%). Ultrasound accounted for a sensitivity of 53% (95% CI 35–70%) and a specificity of 100% (95% CI 86–100%). The addition of US increased the sensitivity to correctly predict an inguinal incision from 29% to 71% and specificity slightly increased from 88% to 92%. This difference is significant ( $p = 0.008$ ) in the bilateral McNemar test (Figure).

## Conclusion

Inguinal US of non-palpable testes and measurement of the contralateral testis are synergistic in predicting the surgical approach. The addition of ultrasound to a clinical exam, performed also under general anesthesia and by an experienced pediatric urologist significantly increases the prediction of the correct surgical approach. Our results translate into five boys needing an US of the NPT to prevent one laparoscopy. Whereas cost-effectiveness of US might be debatable in regard to different healthcare systems, it is proven to be an effective, non-harmful tool to avoid unnecessary diagnostic laparoscopies.

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**Figure.** Performance of the combination of clinical parameters versus added ultrasound to correctly predict inguinal incision or laparoscopy. True pos: correctly predicted inguinal incision. True neg: correctly predicted laparoscopy. False pos: predicted inguinal incision, when laparoscopy was appropriate. False neg: predicted laparoscopy, when inguinal approach was appropriate.

## Introduction

According to the literature, 20% of undescended testes are non-palpable testes (NPT) [1–3]. This number is dependent on the examiner's expertise and referral patterns, and also the question of how non-palpable testis are defined. This paper will focus on a group of boys with testes that are not palpable even under anesthesia, accounting for only 8.5% of all undescended testes in our experience. These testes are either located abdominally, in the inguinal canal or are absent. For the purpose of this study, NPT was defined as a negative result after independent clinical exam by two experienced pediatric urologists and remaining non-palpable under general anesthesia. Also, palpable nubbins were excluded.

Selection of the primary surgical access, when one or both testes are non-palpable is dependent on the presumed location of a possibly existing testis. One clinical sign that may help to decide on the primary surgical approach is contralateral testis hypertrophy. If the scrotal testis exceeds 16–20 mm in length, monorchism is highly probable and an inguinal incision as a primary approach with removal of a nubbin may be an option [4–6]. If, however, neither testicular remnant nor a blind ending ductus deferens is found in the inguinal canal, laparoscopy is required.

Diagnostic inguinal ultrasound (US) of NPT to guide the initial surgical approach was investigated by several studies. A recent meta-analysis found its power too low

to make it clinically useful and current guidelines do not recommend it [7–9]. The value of US to reliably detect abdominal NPT or absent/vanishing NPT has been shown to be limited [7]. In contrast, if a NPT is located in the inguinal canal, US diagnosis is possible and may guide the surgical approach towards an inguinal incision [7,10,11].

The study hypothesis was that the use of ultrasound would not add a significant benefit over clinical exam and the predictive effect of contralateral hypertrophy to predict the correct surgical approach in boys with NPT and non-palpable nubbins (excluding those with palpable nubbins). Our approach differs from other studies as it focuses on the choice of surgery and not primarily on the localization of the testes, furthermore the additional use of US is correlated with the clinical evaluation.

## Patients and methods

Between April 2011 and July 2014, 684 boys underwent surgery for undescended testes at our department. Only boys with a negative clinical exam, where neither testis nor nubbin were identified by palpation ( $n = 58$ , 8.5%) were included in this prospective study. The NPT status was confirmed by repeated, independent, clinical examinations by experienced pediatric urologists before and after US as well as in the operating theatre under general anesthesia, by at least two pediatric urologists and on at least two

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