

# Prevalence and Management of Incidental Small Testicular Masses Discovered on Ultrasonographic Evaluation of Male Infertility

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**Purpose:** We report the safety of surveillance of small testicular masses incidentally discovered during evaluation of male infertility.

**Materials and Methods:** We retrospectively reviewed a prospectively collected database to identify patients with male infertility found to have incidental small testicular masses (hypoechoic lesions less than 10 mm) on scrotal ultrasound. The men were offered close surveillance with interval imaging and office followup. Patient and imaging characteristics were collected to compare the surveillance and surgical groups with additional comparisons between benign and malignant pathologies to elucidate predictors of underlying malignancy.

**Results:** Of 4,088 men in whom scrotal ultrasound was completed for male infertility evaluation 120 (2.9%) were found to have a subcentimeter testicular mass. Average followup was 1.30 years (range 0.1 to 16.9). A total of 18 men (15%) proceeded to extirpative surgery while 102 remained on surveillance at last followup. In those with at least 1 month of followup the mean lesion growth rate was  $-0.01$  mm per year. Reasons for surgery included testicular exploration for infertility, mass growth, positive tumor markers, history of testis cancer, concerning imaging characteristics and patient choice. Six of the 18 men who underwent surgery were found to have malignancy, which was seminoma in all. All malignant lesions were greater than 5 mm on initial imaging and demonstrated vascularity, although size and vascularity were not significantly different from those of benign lesions on final pathology findings. No patients demonstrated advanced or recurrent disease.

**Conclusions:** Small testicular masses are not uncommon, especially in the infertile male population. Most of these masses do not show significant growth during long-term evaluation and can be safely surveilled with close followup.

**Key Words:** testis; ultrasonography; testicular germ cell tumor; infertility, male; risk factors

HISTORICALLY testicular masses have presented as palpable lesions but scrotal US has rapidly become the preferred modality to detect scrotal pathology with sensitivity approaching 100% for testicular masses.<sup>1-3</sup> US

is also increasingly used to assess male factor infertility as an adjunct to physical examination to evaluate intrascrotal characteristics<sup>4,5</sup> and obstructive azoospermia etiologies.<sup>6</sup> As a result, incidentally discovered,

## Abbreviations and Acronyms

STM = small testicular mass  
subcm = subcentimeter  
US = ultrasound

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nonpalpable STMs have been detected with increasing frequency. With current imaging techniques masses as small as 1 mm can be identified but histological diagnosis remains the only method to distinguish benign from malignant lesions.<sup>7</sup>

The natural history of incidentally discovered masses has been reviewed in short-term series with variable conclusions. Common to these series, including our previous review, is the benign nature of many of these smaller lesions, although best practice management remains controversial.<sup>8–10</sup> Some groups have proposed testis sparing surgery as the best means to rule out malignancy while others have reported that careful observation with serial US may be safe and preferable in lesions with particular imaging and size characteristics.<sup>10,11</sup>

Historical management of STMs mimics that of small renal masses, of which the incidence rapidly increased with cross-sectional imaging. Only with long-term series did we accept surveillance as a safe strategy. Now with increasing use and availability of US technology we are seeing an increase in incidental masses in other organs such as the testes and we are faced with the question of how to act upon these findings without compromising patient care.<sup>12,13</sup>

The current literature on long-term followup and safety data on nonpalpable STMs is lacking. The purpose of this study was to update our review of male patients with infertility who were diagnosed with STMs, increasing the evidence for surveillance safety with greater patient numbers and longer followup. We present the largest series of men with incidentally discovered STMs followed by active surveillance with specific attention to factors associated with an increased risk of malignancy.

## MATERIALS AND METHODS

Patient information is prospectively collected in an institutional review board approved database on all patients referred to our tertiary male infertility center. Patients with abnormal scrotal anatomy or palpable varicoceles complete scrotal US as part of routine clinical practice. All ultrasounds are performed at an internal medical imaging department using standard protocol with high frequency (12 MHz) linear array transducers and interpretation by radiologists specializing in ultrasound. Grayscale images are supplemented with color and pulsed wave Doppler to assess for vascularity. US images were interpreted while blinded to tumor markers, semen parameters and other patient factors.

Available scrotal US reports between January 2008 and July 2014 were cross-referenced to our infertility patient database and searched for men with more than 1 scrotal US or reports containing the key words hypoechoic, mass, nodule, tumor, lesion or neoplasm. Infertility cases with blood work including testicular tumor

markers ( $\alpha$ -fetoprotein,  $\beta$ -human chorionic gonadotropin or lactate dehydrogenase) were also included. Individual patient charts were subsequently reviewed to identify those with incidental, nonpalpable, small testicular masses, defined as hypoechoic lesions less than 10 mm. Masses 10 mm or larger on initial imaging or with alternative echogenic features (eg calcifications, or hyperechoic or anechoic findings) were excluded from study. We also updated followup in 39 patients reported in our prior series from 2001 to 2008.<sup>10</sup>

We discuss observation as a reasonable option in men incidentally found to have a subcm nonpalpable mass. Our STM surveillance protocol includes serial US at 1, 3, 6 and 12 months, and annually thereafter. Testicular tumor markers are not routinely obtained but they are included for men who are at what is thought to be higher risk for malignancy (large maximal diameter, vascularity or a history of previous testis malignancy or cryptorchidism).<sup>10,14</sup> Indications for surgery include significant lesion growth, elevated tumor markers, concerning imaging characteristics, patient preference or another need for testicular exploration such as sperm extraction.

For STM extirpative surgery we perform a testis sparing approach if benign pathology can be confirmed by frozen section analysis, which correlates well to the final pathological diagnosis of STMs.<sup>15</sup> While others have reported microsurgical approaches alone to dissect STMs,<sup>16</sup> we have found that intraoperative US aids in real-time localization of the mass in conjunction with optical magnification.

Demographics, serial imaging, laboratory data and pathology reports were collected for all patients. Serial imaging reports were reviewed for lesion size, laterality, number and vascularity. Lesion interval growth and followup were measured between the first and the last ultrasound reports. Descriptive statistics were calculated in the overall cohort as well as in the surveillance and surgical subgroups. Between group comparisons for continuous and categorical data were performed with the Student t-test and Pearson chi-square test, respectively, with  $p < 0.05$  considered significant. Further comparisons were made in the surgery group for those with benign and malignant pathologies. All statistical analyses were performed with GraphPad™ software.

## RESULTS

A total of 120 men were identified with subcm hypoechoic testicular masses during evaluation of male infertility, including 81 during the current study period and 39 from the previous 2001 to 2008 cohort (fig. 1). STMs were noted in 2.9% of 4,088 infertile men who underwent scrotal US from 2001 to 2014. The mean age of men with a STM was 36.7 years (table 1). A solitary lesion was present in 63 men (52.5%) and 57 (47.5%) presented with multiple STMs. A total of 87 men (72.5%) had unilateral lesion(s) while 33 (27.5%) had involvement of both testes. Vascularity was noted in 38 cases (42.2%). One patient (0.8%) was believed to have a palpable mass on repeat examination. Serum testicular tumor

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