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Frequency of revision orchidopexy in Australia 1995–2014☆

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ABSTRACT

Background/aim: International criteria currently suggest orchidopexy at 6–12 months for congenital undescended testis (UDT). Some children require repeat orchidopexy for recurrent UDT. This study aimed to assess practice in Australia over a 20-year period.
Methods: We examined 20 years of Australian orchidopexy data (1995–2014) from the Department of Human Services to explore the national revision orchidopexy rates over time.
Results: The total number of orchidopexy revisions was 890 over 20 years compared with 25,984 primary operations. More than 50% of all primary and revision orchidopexies in 0–14 year-old boys were performed in major population centers of NSW and Victoria (which hold 52% male population of same age), with a small number of revisions on 15–24 year-old males. The incidence of revision orchidopexy significantly decreased over the 20-year period in boys ages 0–14 years old, from 276 operations between 1995 and 1999 decreasing to 165 operations between 2010 and 2014 (−53%), compared to a population increase of +15% ($p < 0.05$).
Conclusion: These data demonstrate a decrease in revision orchidopexy since 1995, which may be related to change in referral practice with more children undergoing orchidopexy (primary and revision) by pediatric surgeons over the 20-year period.
Level of evidence: Level IV.
Type of Study: Therapeutic Case Series with no Comparison Group.

Recommendations for cryptorchidism have dramatically changed over the last 20 years, with the recommended age of surgery changing from 2 to 6 years to between 6 and 12 months of age [1–3]. In Australia, orchidopexy is performed for both congenital UDT and acquired UDT [4], where the testis is known to be in the scrotum in the first 3–6 months of age but is found to be out of the scrotum later in childhood. Acquired UDT has been identified in the last 20 years, and is likely the result of the spermatic cord not elongating at the same rate as the pelvis enlarges with age and the scrotum becomes further from the groin [4,5]. The current recommendation in Australia is to operate on acquired UDT once the testis no longer spontaneously resides in the scrotum [5,6].

Failure to treat both congenital and acquired UDT at the right time may impact on male fertility, and congenital UDT also has an increased risk of testicular cancer. Cellular degeneration is a major risk in UDT as the higher inguinal or intra-abdominal temperature (35–37 °C) versus the scrotum (33 °C) inhibits neonatal germ cells from transforming into the stem cells for spermatogenesis at 3–6 months of age, which is thought to be the cause of long-term infertility and increased cancer risk [7].

The incidence of orchidopexy is commonly used as a surrogate for both the diagnosis and treatment of cryptorchidism [1–3]. Trends regarding international incidence vary according to country [8,9], with the number of orchidopexies being performed in Australia decreasing over the previous 20-year period [6]. Australian data also demonstrate a decrease in age at the time of orchidopexy over the previous decade [10]. Recurrence of cryptorchidism following orchidopexy has been reported to range from 6.7% to 10% [11,12]. The incidence of revision orchidopexy in the state of New South Wales (which accounts for 22% of the population of Australia) was reported recently to be 9% [10]. The cause for revision orchidopexy is often unclear, and causes may be multifactorial. The leading cause is thought to be suboptimal division and/or ligation of the patent processes vaginalis [13]; however, other possible causes include inadequate dissection of the cremasteric muscles or low ligation of the patent processus with subsequent tethering

Abbreviations: UDT, Undescended testes.

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of the cord. We examined 20 years of Australian national orchidopexy data from 1995 to the present, to determine whether there have been any changes in the frequency of revision orchidopexy.

1. Methods

Orchidopexy data were collected from the Australian Department of Human Services (DHS), for the calendar years 1994–2015 after ethical approval (HREC 35176A). Data were extracted using the operation codes for orchidopexies for all patients between 0 and 24 years (public and private). Operation data for scrotal explorations were excluded, as well as orchidopexy for indications other than UDT i.e. testicular torsion, torsion of a hydatid of Morgagni, or hydrocele.

National population data were collected from the Australian Bureau of Statistics (ABS). Census data for each age group were available for years 1996, 2001, 2006, and 2011, so demographic data for other years were ABS estimates. The number of orchidopexies per annum was divided arbitrarily by the ABS into 3 age groups: 0–4, 5–14 and 15–24 years old, (and we were not able to obtain the numbers for each year of age because of privacy restrictions). Each 5-year quantum of data was averaged for each age group. A Poisson regression model was fitted to the data for each age group. An Incident-Rate Ratio (IRR) indicated the estimated annual (compound) rate of change over the time period to reveal the trends in revision operation rates related to the whole population, as well as the rate of primary orchidopexies. Calculations were performed in Stata 14.

2. Results

2.1. Number of revision orchidopexy operations in Australia

There was a total number of 890 revision orchidopexies in Australia over the 20-year period, when in the same period there were 25,984 primary orchidopexies. Overall, the total number of operations has consistently decreased over the last 20 years (Fig. 1). There were 291 revision operations in the 5 years between 1995 and 1999 compared to 170 in the 2010–2014 period (Table 1).

When the annual number of operations was divided per state, the number of 15–24 year old revision orchidopexies was very small. The states of NSW and Victoria accounted for more than 50% of revision orchidopexies, on boys aged between 0 and 14 years, over each of the last 20 years. NSW and Victoria accounted for 45–62% of all primary orchidopexies, in boys aged between 0 and 14 years, over the last 20 years. In comparison to the population of 0–14 year old boys, NSW and Victoria hold 52% of the male population aged 0–14 years over the same 20-year period.

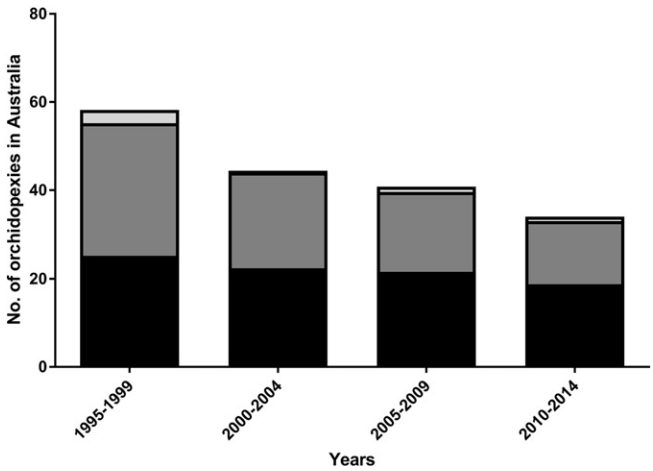

Fig. 1. Histogram showing the total number of revision orchidopexies in Australia by age group. (Black = 0–4 years of age; dark gray = 5–14 years of age; light gray = 15–24 years of age.)

When the operation rates are divided into the three age groups; 0–4 years, 5–14 years and 15–24 years, it can be seen that the total number of revision operations in children under 5 years decreased 25% from a cumulative total of 126 in the first 5 years, to 94 over the last five-year period. By contrast, in the 5–14 age group the cumulative total of revision surgery decreased from 150 operations in the first 5 years, to 71 operations in the last 5 years (57% decrease) (Table 1). There were only small numbers in the 15–24 year old group, however the total number of operations fell from 15 in the first to 5 years to 5 operations in the last 5 years.

2.2. Incidence of revision orchidopexy relative to the total population in each age group

The number of revision orchidopexies in each age group was divided by the total population of boys in each age. This shows a progressive decrease in the number of orchidopexies per head over the 20-year period over all age groups (Fig. 2a).

Meanwhile, the population of males 0–24 years of age increased from 3.4 million in the 1995–1999 period, to 3.9 million in the 2000–2004 period. This means that in 1995 there were 0.66 million boys under 5 compared with 0.8 million in 2014. In the 5–14 age group, there were 1.32 million in the 1990s, compared to 1.49 million in 2014, while in the 15–24 year old age group there were 1.37 million males in the 1990s, compared to 1.6 million in 2014.

Using a Poisson regression model for each age group (Fig. 2b), the IRR indicated the estimated annual (compound) rate of change over time. There was moderate to strong evidence of a decrease in the rate of revision orchidopexy across all age groups. Boys under the age of 5 years showed a decrease in the rate of orchidopexy of 2.8% per year ($p < 0.005$). For the 5–14 years age group, the average decline was 5.7% per year ($p < 0.005$). For adolescents and young adults (15–24 years of age), there was an decrease of 8.4% per year ($p = 0.01$).

2.3. Number of revision orchidopexy operations relative to the primary orchidopexy in each age group

The number of revision orchidopexies in each age group relative to the number of primary orchidopexy operations in each age showed a progressive decrease in the proportion of revision orchidopexies over the 20-year period (Fig. 3). This meant that the frequency of revision operations fell from 4% in the 1990s to 2.4% in 2010 to 2014. This is despite the total number of primary orchidopexies per annum decreasing 20% decrease between 1995 and 2000 and 2001–2005, then remaining constant between the periods 2001–2005 and 2006–2010, and then demonstrating a 16% increase between the time periods 2006–2010 and 2011 and 2014.

Using a Poisson regression model for each age group (Fig. 3b), the IRR indicated the estimated annual (compound) rate of change over time. There was moderate to strong evidence of a decrease in the rate of revision orchidopexy across all age groups. Boys under the age of 5 years showed a decrease in the rate of orchidopexy of 2.6% per year ($p < 0.005$). For the 5–14 years age group, the average decline was 2.4% per year ($p < 0.005$). For adolescents and young adults (15–24 years of age), there was an decrease of 9.5% per year ($p = 0.01$).

3. Discussion

This study found that the overall number of revision orchidopexy operations in Australia have decreased over the 20-year period. Compared to the population, there was moderate to strong decrease across all age groups. When comparing the ratio of revision orchidopexy to primary orchidopexy, there also was a decrease over the 20-year period; predominantly in the 15–24 age group.