CHAPTER 5: GENERAL DISCUSSION & FUTURE PERSPECTIVES

SYNOPSIS: In this chapter the general discussion and the future perspectives are included. A new guideline is developed and the National Testis Centre is introduced.
5.1 GENERAL DISCUSSION
GENERAL DISCUSSION

The aim of this thesis was to investigate the circumstances and indications for surgical treatment in congenital and acquired undescended testis by analysing the epidemiology and outcome in various patients categories in comparison with the literature. The studies were performed in the departments of Paediatrics and Surgery of the Medical Centre Alkmaar in close collaboration with the Youth Health Care Institution of the “GGD Hollands Noorden”. From the early 1990s we studied, in the Medical Centre Alkmaar, boys who were referred for a non-scrotal testis. Since the increasing awareness of acquired undescended testis in the mid 1990s, our views on many aspects of undescended testis were renewed. Therefore, we investigated the prevalence of acquired undescended testis among 3433 healthy Dutch schoolboys in close collaboration with the Youth Health Care Institution “GGD Hollands Noorden” by analysing testis position. Adjacent to it, we studied boys who were referred to our outpatient clinic for non-scrotal testis. In these boys, prospective studies on spontaneous descent of acquired undescended testis were done and the high scrotal testis was analysed. The influence of acquired undescended testis on the orchidopexy-rate was studied by analysing the orchidopexy-rate in our hospital in different periods as compared to national figures. We also studied boys with congenital undescended testis by analysing the surgical findings at orchidopexy and by conducting a long term follow-up after orchidopexy. Furthermore, we reviewed the literature on testicular descent and on the frequency of undescended testis and finally, an overview of the current views concerning the different aspects of undescended testis is presented.

THIS THESIS INTERPRETATIONS

The research questions formulated in this thesis were:
1. What are the current opinions of the concept of testicular descent?
2. How frequent is the phenomenon of acquired undescended testis?
3. What is the tendency and the approximate timing of spontaneous descent of the acquired form?
4. Does acquired undescended testis explain the disparity between the apparent incidence of undescended testis at birth and the (high) number of orchidopexies performed?
5. Is the phenomenon of the high scrotal testis a separate entity or part of the spectrum of either congenital or acquired undescended testis?
6. What are the surgical aspects of congenital undescended testis found at orchidopexy?
7. What are the consequences on long-term testicular growth and position after orchidopexy for congenital undescended testis?
8. What is the frequency of undescended testis from birth to adulthood given from the literature?

1. The concept of testicular descent

In chapter 1 of this thesis we reviewed the literature concerning testicular descent. The concept of testicular descent occurring in two stages with separate anatomical and hormonal mechanisms is accepted as an useful model. However, the aetiology of undescended testis, probably being multifactorial, remains largely unknown and undescended testis itself might be considered a complex disorder. This reflects the complicate
mechanisms regulating testicular development and descent from intra-abdominal location into the bottom of the scrotum, involving different hormonal, genetic, mechanical, neurological and environmental factors. It is important to note that there are two (post-natal) periods of testicular descent, the first year and the peripubertal period. The spontaneous descent in the peripubertal period can probably be explained by recognising the acquired form of undescended testis. Although our understanding has advanced in the last decades, more work is needed to help us resolve the many unanswered questions about this intriguing process of testicular descent and maldescent. [Chapter 1.1]

2. Frequency of acquired undescended testis
We have shown that the prevalence of acquired undescended testis in 6-year, 9-year, and 13 year-olds ranges from 1.1% to 2.2%. It confirms the high rate of this phenomenon seen later in childhood and may offer an explanation for the high rate of orchidopexies performed later in childhood. Likewise, we have shown that medical youth screening programmes are successful for detecting UDT in the early years. [Chapter 2.1]

3. Tendency and approximate timing of spontaneous descent of acquired undescended testis
We found that three of four acquired undescended testes will descend spontaneously in early and mid-puberty. This observation might be important, since orchidopexy might therefore be recommended at a puberty stage according to Tanner of at least G3 (testicular volume of at least 10 ml) in case of non-descent. One should, however, realise that this is a temporary treatment advice where, among others, individual factors play a role. Further investigations are necessary to analyse why one out of four acquired undescended testis will not descent spontaneously. In addition, the most perfect timing of orchidopexy in case of these non-descenders need to be determined. Therefore, it might be interesting to study the hormonal regulation. Furthermore, future research should provide evidence that a waiting policy is preferable above orchidopexy, since the risk for infertility and testicular cancer in adulthood is still unknown. [Chapter 2.2]

4. Acquired undescended testis as an explanation for the high number of orchidopexies
The hypothesis that acquired undescended testis may offer an explanation for the high rate of orchidopexies performed later in childhood seems realistic as recognition of acquired undescended testis as a separate entity and implementation of an expectative policy turned out to be crucial for reducing the (high) number of orchidopexies. [Chapter 2.3]

5. The phenomenon of the high scrotal testis
The high scrotal testis is defined as a testis which can be manipulated through the scrotal entrance into a high but unstable scrotal position while further traction on cord structures is painful. The high scrotal testis is often considered as a separate and distinct entity, however, we demonstrate that high scrotal testis is part of the spectrum of either congenital or acquired undescended testis. This distinction is important, since spontaneous descent can occur at puberty in acquired high scrotal testis and therapeutic approach might be different between both forms. [Chapter 2.4]
6. Surgical aspects of congenital undescended testis
The cause of congenital undescended testis is presumed to be a defect in the complex anatomical migration rather than in hormonal regulation. However, the exact mechanisms leading to maldescent of the testis are not yet fully understood. In order to identify anatomical abnormalities which may have contributed to congenital undescended testis, the surgical findings were reported. We have shown that a congenital undescended testis is mainly characterised by canalicular position and is nearly always associated with a (wide) open processus vaginalis. It seems that testicular maldescent is rarely congenital in the absence of a complete hernial sac. Abnormal attachment of the gubernaculum and epididymal abnormalities were found less frequently in our study. However, these findings do not exclude the option that abnormalities in these structures are likely to result in congenital maldescent. In fact, other series have shown a much higher incidence of gubernacular and epididymal abnormalities associated with congenital undescended testis. To gain better information regarding surgical findings, future research is essential. Preferably, a prospective evaluation in which congenital and acquired undescended testis are identified separately, in order that a comparison between the surgical findings of these two entities can be made. [Chapter 3.1]

7. Consequences after orchidopexy for congenital undescended testis
Congenital undescended testis are recommended for surgery, nowadays at 6-12 months of age. Nevertheless, evidence regarding the effectiveness of early treatment has not been presented yet. We categorised undescended testis into congenital and acquired forms and demonstrated that orchidopexy for congenital undescended testis seems not unfavourable in terms of long-term testicular growth and position. However, the surgically treated unilateral congenital undescended testis shows a significant difference in volume with its counterpart. This might be due to the primary condition. Our study then provides support for surgery of congenital undescended testis. Nevertheless, longer follow-up is necessary to further study the consequences of early orchidopexy. [Chapter 3.2]

8. Frequency of undescended testis given from the literature
The incidence of undescended testis shows variable figures in the literature. These variable reported undescended testis rates might also be attributed to lack of distinction between congenital and acquired undescended testis. Congenital undescended testis is often followed by spontaneous descent and, accordingly, lower rates, i.e. 0,9 - 1,6% have been described at the age of 3 months in contrast to the rates at birth among term boys with birth weight > 2,5 kg. This spontaneous descent of congenital undescended testis occurs usually during the first few months of life. The actual frequency of acquired undescended testis essentially remains unclear in the literature because of the shortage of studies performed at an older age, and of studies reporting on previous position. Nevertheless, acquired undescended testis contributes to the increase in the rate of undescended testis in school-aged children. This form, however, has also a definite and constant tendency to spontaneous descent in the prepubertal period in three quarters of the cases. [Chapter 4.1]
5.2 FUTURE PERSPECTIVES
FUTURE PERSPECTIVES

In the early 1990's a “Working group on Undescended Testis in Boys” was formed in our hospital and ever since we are studying boys with non-scrotal testes. In the following years, the awareness that acquired undescended testis is a frequent but underrated phenomenon became more apparent.

The high rate of orchidopexies performed later in childhood can largely be accounted for by the acquired form. For example, the prevalence figures of acquired undescended testis closely correspond with the 1-2% late orchidopexy-rate. In accordance with the Dutch consensus, although intended to prevent surgery on retractile testes, surgical treatment of acquired undescended testis was withheld eventually leading to recognition of spontaneous descent in the peripubertal period. It seems likely that the natural course of congenital undescended testis differs from that of acquired undescended testis and therefore, the management of acquired undescended testis might differ from the approach of congenital undescended testis. In acquired undescended testis, orchidopexy might be postponed until mid or late puberty.

However, unresolved issues remain. The central dilemma facing clinicians involved in the care of boys with undescended testes is that there is still no definite proof that surgical treatment is beneficial and that the risk of infertility or testicular cancer can be reduced. At present, there are still no long-term studies showing improved fertility at adolescence after early surgery. In addition, a surgically corrected undescended testis retains a risk for developing testicular cancer. On the other hand, recent studies seem to report that prepubertal orchidopexy might decrease the risk of testicular cancer. However, in these studies, no distinction was made between congenital and acquired undescended testis and it is unclear whether late orchidopexy in these studies is attributable to failure of detection, late referral, misdiagnosed retractile testes, or acquired undescended testis. Therefore, the conclusions of these studies are difficult to interpret in the individual patient. One might speculate that malignancy risk may be lower in the acquired form in contrast to congenital undescended testis, probable because germ cell development in infancy is normal in acquired undescended testis. In addition, since the recommended age for orchidopexy of the congenital form is nowadays much lower (6 to 12 months) than a couple of years ago one might also speculate that the risk group for developing testicular cancer are the patients with congenital undescended testis in whom orchidopexy is delayed.

The long-term prognosis of acquired undescended testis is still largely unknown. It is unknown whether a waiting policy between the age of 2 years and puberty might lead to possible testicular damage. Though, prognosis of acquired undescended testis after prepubertal orchidopexy is also unknown. One should bear in mind that orchidopexy itself can eventually result in short and long-term complications, such as iatrogenic vascular complications and damage of the spermatic cord structures. Some authors even suggest that testicular damage due to surgery might be more extensive than generally assumed. Also, long-term studies justifying the early policy recommended for congeni-
tal undescended testis have also not yet been published. Recently, it has been shown, that early surgery of congenital undescended testis seems not detrimental in terms of long-term testicular growth and position. Nevertheless, a lot of critical questions remain largely unanswered. Therefore, there is a need for large clinical studies during the coming years. These studies are, however, difficult to perform. These are long-term studies, approximately taken up to 20 years. Annual follow-up by the same physician is of great importance to make sure the boys will come back and therefore, keeping the cohort together. Dealing with boys instead of adults also makes it more complex, since it is not ethically feasible to use testicular biopsy or semen analysis to evaluate testicular function. Only determination of testicular volume is acceptable, especially for serial determination over a long period with yearly assessment.

Since there is now good information that boys with acquired undescended testis has spontaneous descent in many cases in puberty, we believe that orchidopexy of acquired forms can be postponed until mid or late puberty. And as a result, our study showed that recognition of acquired undescended testis is crucial for reducing the high number of late orchidopexies. We expect that extension of our expectative policy might lead to a further reduction in orchidopexy-rates, nationally and internationally. However, prognostic factors for spontaneous descent of the acquired form must be identified, that criteria for mid-pubertal orchidopexy in case of non-descent of acquired undescended testis can be developed. In order to make a founded statement about the optimal treatment of acquired undescended testis in the future.

In the clinical setting, the importance of the previous testicular position in undescended testis should be more outlined and especially during the first years of life, testis position should be recorded several times. Consequently, repeated examination and careful history taking are crucial. In the future, familiarity with the phenomenon of acquired undescended testis has to be promoted. In the Netherlands, the conclusions of the first Development Conference on 'non-scrotal testis' should be revised and a consensus on treatment has to be reached.
5.3 GUIDELINES ON THE TREATMENT OF UNDESCENDED TESTIS
GUIDELINES ON THE TREATMENT OF UNDESCENDED TESTIS

1. BACKGROUND
Undescended testis (synonyms: cryptorchidism, retentio testis, maldescensus testis) is one of the most common genitourinary disorders in boys. The management of undescended testis has been a debatable issue among physicians for many years, the most important decision is the age at which correction should be attempted. The rationale for treatment is to preserve fertility and to improve early detection of testicular malignancy.

2. DEFINITION AND CLASSIFICATION OF UNDESCENDED TESTIS
A non-scrotal testis may be either retractile or truly undescended.

Retractile testis
A retractile testis is a normally developed testis and has completed the process of descent. The testis can be manipulated into a low scrotal position where it remains in a stable position without tension. (Further) tension on cord structures is not painful. When the cremasteric reflex is induced, the testis is drawn out of the scrotum into the groin region. A retractile testis is most common in boys aged 5-6 years and should be distinguished from the ‘high scrotal testis’. This distinction is important, since a retractile testis is considered a physiological, innocent phenomenon, while the high scrotal testis should be regarded as a part of the spectrum of either congenital or acquired undescended testis. However, retractile testes may have a possible higher risk of becoming an acquired undescended testis (1). Retractile testis do not need any form of treatment except observation (2).

Undescended testis
An undescended testis is defined as a testis which cannot be manipulated into a stable scrotal position in its most caudal position. Consequently, this includes all testes which neither reside in, nor can be manipulated into the scrotum, as well as testes which can be manipulated through the scrotal entrance into a high scrotal position but, after release immediately retract to the groin region. The latter is also called the “high-scrotal testis” or “gliding testis”. One of the clinical characteristics is that further traction on the cord structures is painful.

At present, an undescended testis is classified into two categories: congenital and acquired forms.

Congenital undescended testis
A diagnosis of congenital undescended testis is made if the testis has never been descended from birth and does not descend during the first year of life. A testis usually descends around the term date, but descent can still occur during the first 3 to 6 months after birth. The aetiology of congenital undescended testis is probable multifactorial. At the age of 1 year in term and/ or birth weight > 2,5 kg infants, approximately 1,0 - 1,5%
are affected by this condition (3).

**Acquired undescended testis**
An acquired undescended testis is descended in the first years of life, but can no longer be manipulated into a stable scrotal position later in life. Acquired undescended testes involve high scrotal as well as (inguinal) ascending testes. The process of residing outside the scrotum seems to start early in life. Initially, the testis can still be brought through the scrotal entrance into a high scrotal position but retracts immediately to the groin region after release. Further traction on cord structures is painful. This condition is known as the “high-scrotal testis” (synonym: “gliding testis”). In some boys the process continues and the testis finally can no longer be manipulated into the scrotum, and becomes fully extra-scrotal. This condition is termed “ascending testis”. A number of mechanisms for the development of ascent have been suggested. A persisting processus vaginalis might allow the testis to ascend to become trapped in a higher position (4), thereby preventing normal elongation of the spermatic cord. In addition, cremaster muscle spasticity has been suggested (5). The prevalence of acquired undescended testis in 6-, 9-, and 13-year olds varies from 1.2% to 2.2% (6). Acquired undescended testis caused by scar-retraction after groin surgery is named the secondary form (synonym: “trapped testis”).

### 3. **DIAGNOSTICS**
An accurately conducted physical examination, if necessary with complementary tests, and data regarding previous testicular position, is essential for establishing the correct diagnosis.

**Physical examination**
Examination should be performed at least twice, separated by several weeks, by the same physician. Examination takes place in the presence of one of the parents and the physician must ensure his/her hands are warm. Firstly, the external genitalia are scrutinized to determine a possible scrotal position. Examination of the genitalia starts in supine position by which the groin region is palpated cranially to caudally. Thereafter, examination is repeated in frog-leg position by which the groin region is palpated cranially to caudally. The most caudal testicular position is determinative for the definitive location. It is important to assess whether further traction on the cord structures is painful. The volume of the testis can be determined with a Prader orchidometer, possibly augmented with ultrasound. Pubertal development is assessed according to Tanner’s developmental stages.

**Ancillary tests**
Endocrinological and/or chromosomal evaluation is warranted in bilateral non-palpable congenital undescended testis. Ultrasonography, if indicated augmented with MRI, has restricted value. Diagnostic laparoscopy can be used for the non-palpable testis.
Information on previous testicular position
Longitudinal data concerning previous testicular position are necessary to distinguish between congenital and acquired undescended testis. In the Netherlands, these data are available at the Youth Health Care Institutions.

4. TREATMENT OF UNDESCENDED TESTIS

Congenital undescended testis

Diagnosis ≤ 12 months of age:
A congenital undescended testis should be surgically treated between 6-12 months of age (7,8). This is based on evidence of histological damage to the undescended testis (9,10) and the high rate of spontaneous descent during the first months of life. Even now, there is still no firm proof that early surgery has an improved outcome on later testicular function. A recent prospective randomised study showed that orchidopexy at 9 months vs. at 3 years results in superior testicular growth in boys undergoing early surgery (11). However, longer follow-up is still required, to await whether this difference will sustain until adulthood and will result in improved spermatogenesis.

The treatment of choice is surgical and comprises orchidofuniculolysis (‘mobilisation of the testis and the cord structures’) followed by orchidopexy (‘fixation of the testis in the scrotum’). Orchidopexy should be performed by a surgeon familiar with and experienced in paediatric surgery or paediatric urology.

There is no indication for hormonal treatment of congenital undescended testis, since the efficacy is poor and several potential side effects have been described (12,13). An exception are the bilateral non-scrotal testes caused by pituitary insufficiency.

The parents of the boys with congenital undescended testis should be well informed of the change of developing testicular cancer after puberty and self examination of these boys at an older age should be recommended.

Diagnosis > 12 months of age:
If a boy with a congenital undescended testis is diagnosed and referred at an older age (i.e. > 12 months) orchidopexy might be recommended. This might be especially true for younger boys (i.e. < 6-8 years), for boys with bilateral undescended testes and for boys with (high) canalicular or abdominal testes. However, several reasons might be considered:

- Spontaneous descent of a congenital undescended testis is unlikely at puberty, although studies documenting this hypothesis have not been published.
- It is unknown whether a congenital undescended testis might suffer progressive, histological damage lying in a supra-scrotal position during the prepubertal period.
- Pettersson et al. (14) reported recently that men who underwent orchidopexy for undescended testis prior to puberty are less likely to develop testicular cancer than those who treated later in life.
- Rasmussen et al. (15) concluded that late spontaneous bilateral descent of the testis carries a serious risk of later impaired spermatogenesis, but it remains to be shown that early treatment can secure fertility of these patients.
• How essential are normal anatomical relations of the genitalia for an undisturbed psychosexual development of these boys? Having two testes in the scrotum might reduces the psychological vulnerability.

On the other hand, there might be some arguments of postponing immediate surgical intervention until (early) puberty:

• Chilvers et al. (16) found little evidence that operation early rather than late within the age range of 4 to 14 years has any effect on subsequent fertility.
• Furthermore, Lipschutz et al. (17) concluded that men who had undergone orchidopexy for unilaterally undescended testis at 4 to 12 years had abnormal spermatogenesis.
• Puri et al. (18) performed semen analysis on men who had undergone orchidopexy at ages 7-14 years and 30% of men with bilateral (palpable) undescended testes had normal sperm density. Men who had bilateral impalpable testes were azoospermic.
• ORP carries a 5 to 6 percent risk of damage to the spermatic cord structures resulting in gonadal atrophy (19,20).

Acquired undescended testis
In boys with acquired undescended testis, prepubertal orchidopexy is no longer recom-mended, since 57-76% of these testis will descend spontaneously at early or mid puberty (21,22). In case of non-descent, orchidopexy should be performed at (mid) puberty. Whether this is an adequate therapeutic approach still remains to be seen, since the lack of long term longitudinal data hampers exact recommendations. At present, criteria for pubertal orchidopexy are still poor and should be developed. The use of H(uman) C(horionic) G(onadotrophin) as treatment of acquired undescended testis have been advocated with varying results. This however, seems to offer no advantages above waiting until puberty. The use of L(uteinising) H(ormone) R(eleasing) F(actor) in the treatment of acquired undescended testis has no evidence based support.

5. REFERRAL
A boy with a congenital undescended testis should be referred for treatment at the latest around the age of 6 months. Orchidopexy must be performed by a surgeon familiar with and experienced in paediatric surgery or paediatric urology, since a careful operation technique is determinative for the results of the treatment. Referral to a centre for paediatric urology or paediatric surgery can be considered. A “boy” with bilateral, non-palpable congenital undescended testis should be referred directly for further (endocrinological and genetic) evaluation.

A boy with an acquired undescended testis must be referred after diagnosis for annual follow-up and if indicated for midpubertal orchidopexy. It is desirable that a separate team is involved in the treatment of this condition according to this guideline. Especially, the planning of a possible midpubertal orchidopexy at the correct moment depends on individual factors and demands the necessary expertise (Figure 1).
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6. RECOMMENDATIONS FOR FUTURE DEVELOPMENTS

In the Netherlands, we recommend a National Testis Centre (N.T.C.) to be instituted which heads for 8-10 extensions, i.e. specialised testis centres. Each boy with a (suspected) undescended testis should be referred to one of these extensions in his region headed by the National Testis Centre. In this way, a specialised team is involved in the documentation, treatment and follow-up of boys with an undescended testis. Consequently, long-term studies and follow-up can be better accomplished, in order that unequivocal recommendations about the treatment and prognosis of undescended testis can be given in the future.

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5.4 THE NATIONAL TESTIS CENTRE (N.T.C.)
THE NATIONAL TESTIS CENTRE (N.T.C.)

The institution of a National Testis Centre (N.T.C.) in the Netherlands is mainly based on the following:

- “The Development Conference on Non Scrotal Testis”, which was held in the Netherlands in 1986, must be seen as a major step forwards in the treatment of a boy with an undescended testis in our country. One of its most important contributions was the fact that the conference focussed attention on the importance on meticulous documentation of testicular position in each boy at birth, and in the early years of life, during health centre visits. This is unique in the world. These registrations eventually led to the recognition of the acquired undescended testis as a separate entity. At present, the Netherlands is the first and only country in the world where prepubertal orchidopexy in boys with acquired undescended testis is withheld.

- Nowadays, there is an urgent need for longitudinal data of boys with a congenital or acquired undescended testis. For example, the long term follow-up of acquired undescended testis after spontaneous descent or midpubertal orchidopexy is unknown as well as after prepubertal orchidopexy. Furthermore, criteria for midpubertal orchidopexy in case of non-descent of acquired undescended testis need to be developed.

- Recognition of acquired undescended testis and implementation of an expectative policy will reduce the high number of (late) orchidopexies in our country from 3000-4000 to 1200-1400 operations each year (1). Consequently, the surgical expertise will gradually diminish among general surgeons and urologists. Therefore, a separate team should be involved in the treatment of this condition according to an established protocol.

- Within the Youth Health Care Centres, new guidelines for the treatment of undescended testis are presently being developed, enabling recognition of acquired undescended testis in prepubertal boys. We speculate that in 2 to 3% of the boys (i.e. 1800 to 2700 boys each year) a diagnosis of acquired undescended testis will be made. To ensure adequate treatment and to prevent unnecessary surgical interventions, referral to a specialised centre should be considered.

- There is a need for implementation of an universal documentation of the position of the testis as observed at physical examination. Among others, an universal documentation is needed for correct diagnosis and treatment and to enable long-term follow-up studies.

Organisation:
The National Testis Centre will head for 8-10 extensions, i.e. specialised testis centres located throughout the country in generalised or academic hospitals. Each boy with a (suspected) undescended testis should be referred to the concerning extension in his region. In this way, a specialised team is involved in the treatment and follow-up of children with an undescended testis and treatment according to protocol is warranted. Consequently, long-term studies and annual follow-up can be better accomplished and central registration by the National Testis Centre is guaranteed. These extensions should be manned with a secretariat, one or two nurse practitioners and other experts with
experience in management of children with undescended testis. Close collaboration is necessary between these extensions and the Youth Health Care Institutions in their environment. If orchidopexy is required, referral to a regional Academic Centre will take place were orchidopexy should be performed by a surgeon familiar with and experienced in paediatric surgery or paediatric urology.

The “Alkmaar Protocol”, developed during the last decade, might serve as an example for the 8-10 extensions. Within this protocol, annual follow-up, central recording, orchidopexies according to protocol, close collaboration between the involved disciplines (Paediatrics, Surgery, Urology) and the Youth Health Care Institutions takes place.

In the future, when data are sufficient to make a founded statement about the treatment of undescended testis, this construction might be released.

The National Testis Centre (N.T.C.) should be responsible for:

- Taking care of adequate treatment of boys with an undescended testis according to the latest insights.
- Editing treatment protocols for congenital as well as acquired undescended testis.
- Heading of the extensions, in organisational as well as medical meaning.
- Administering a central database with information of all the referred boys.
- Giving adequate information and education. Educating and extra training of physicians/nurse practitioners.
- Developing information material for parents/children, physicians, nurses and paramedical personnel.
- Initiating, developing and conducting scientific studies and looking after scientific output. In order to improve the prognosis and to prevent unnecessary surgical interventions.

Referral to the National Testis Centre (N.T.C.):
A boy with a non-scrotal testis will be referred to one of the 8-10 extensions, i.e. specialised testis centres in his neighbourhood. Diagnosis and (annual) follow-up will take place in this extension according to protocol. If orchidopexy is required, the boy will be referred to a paediatric surgeon or paediatric urologist experienced in performing this surgical procedure. After surgery, the boy will be referred back to the extension for annual follow-up. (See Figure 1).

Cost/benefit ratio:
The high rate of orchidopexies performed in the Netherlands can nearly fully be explained by surgical treatment of the acquired undescended testis. When rurally orchidopexy will be postponed until mid puberty in boys with acquired undescended testis, the number of surgical interventions will decrease from the current number of 3500 up to approximately 1200 to 1400 per year. This saving of some millions of euros should be used to finance the National Testis Centre with its extensions.
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Advisory Board:
specialists in the field of paediatric surgery, paediatric urology, paediatrics, youth health care etc.

National Testis Centre

- Taking care of adequate treatment
- Heading for the extensions
- Educating and extra training
- Central registration/database
- Scientific research

Figure 1 The National Testis Centre

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