Acta Pædiatrica ISSN 0803-5253

LETTER TO THE EDITOR

# Is the prohibition of hormonal treatment for cryptorchidism, as suggested by the Nordic consensus group, justifiable?

Faruk Hadziselimovic (faruk@magnet.ch)[1], Dragana Zivkovic[2]

1.Kindertagesklinik Liestal Switzerland, Liestal, Switzerland
2.University Children's Hospital, Department of Pediatric Surgery Novi Sad, Vojvodina, Serbia

**Keywords**
Cryptorchidism, Hormonal treatment, Fertility

**Correspondence**
Faruk Hadziselimovic, MD, Professor of Pediatrics at University Basel,
Switzerland, Kindertagesklinik Liestal,
Oristalstrasse 87a, 4410 Liestal, Switzerland.
Tel.: +41-61-922-05-25 | Fax: +41-61-922–05-33
Email: faruk@magnet.ch

DOI:10.1111/j.1651-2227.2007.00417.x

Recently, the Nordic consensus on the treatment of undescended testis prohibited the use of hormones because of possible long-term adverse effects on spermatogenesis (1). This conclusion was based on articles published by groups from Finland and Denmark analyzing testicular histology and apoptosis of the germ cells (1).

Even if human chorionic gonadotropin (HCG) treatment induces increased apoptosis of the germ cells, it is still irrelevant for subsequent fertility outcome. The follow-up spermiogram performed in these patients showed no significant difference in fertility outcome between the treated and untreated groups. The second reason was the observation of decreased numbers of germ cells in cryptorchid boys aged 1–3 years who were previously unsuccessfully treated with HCG in comparison to the untreated group (1). These results, although statistically significant, are again irrelevant for the fertility outcome because the germ cell count in both groups was below 0.2 germ cells per tubular cross-section. If the germ cell count is $<0.2$, the majority of patients will develop infertility irrespective of whether they had only surgery or hormonal pretreatment in addition to orchidopexy.

Abnormal contralateral testis is ideal for evaluating the effect of hormonal treatment because there is no effect from abnormal position and increased temperature to interfere with the results. In contrast to the concerns raised by the Nordic consensus group, the results of our recent study showed that hormonal treatment for undescended testis improved the histopathology of the contralateral testis without harming the germ cells (2). Furthermore, neoadjuvant gonadotropin relasing hormone (GNRH) treatment was found to improve the fertility index in prepubertal cryptorchidism (3). Maximum salvage of active germinal tissue is achieved by treating cryptorchidism before the end of the first year of life (3).

We entirely agree with the Nordic consensus group that infertility is the primary concern for the treatment of boys with unilateral or bilateral undescended testes. This especially because analysis of contralateral descended testis in unilateral cryptorchidism demonstrated that cryptorchidism is a bilateral disease, and infertility in cryptorchidism is endocrinopathy of mini-puberty (4,5). It is important to realize that male fertility potential depends on the presence of Ad spermatogonia (5–7). Development of Ad spermatogonia from gonocytes, which takes place during first months of life, was shown to be testosterone dependent (8).

However, early and seemingly successful orchidopexy does not improve fertility in a substantial number of cryptorchid males because it does not address the underlying pathophysiology of cryptorchidism, namely, the impaired transformation of gonocytes into Ad spermatogonia (6,7).

Furthermore, successfully surgically treated patients at risk for infertility after 6 months of luteinizing hormone-relasing hormone analogue (LH-RHa) treatment had a lasting increase in the number of germ cells in their cryptorchid testis (9). The efficacy of the LH-RHa treatment was the best in boys younger than 7 years (9,10). Treatment with LH-RHa normalized sperm concentration in 86% of unilateral cryptorchid males, who were in the high-risk group for developing infertility (Fig. 1). All males in the untreated group (surgery only) were severely oligospermic, with 20% being azoospermic (10). This profoundly changes our current concept of cryptorchidism treatment. For the first time, it is possible to demonstrate that infertility caused by cryptorchidism, which is believed to be a congenital malformation, can be successfully corrected if adequately treated. During the last 35 years, histological studies have contributed the most to our understanding of the aetiology of cryptorchidism. Only the comparison of histology and hormonal levels exemplify hypogonadotropic hypogonadism in the majority of cryptorchid boys. Why the Nordic consensus group did not take the histopathologic findings into consideration remains unclear. Nonetheless, their recommendation as to when a testicular biopsy should be obtained is passé. A testicular biopsy is the only sure way of identifying those cryptorchid boys who need to be treated hormonally with LH-RHa following successful surgery;

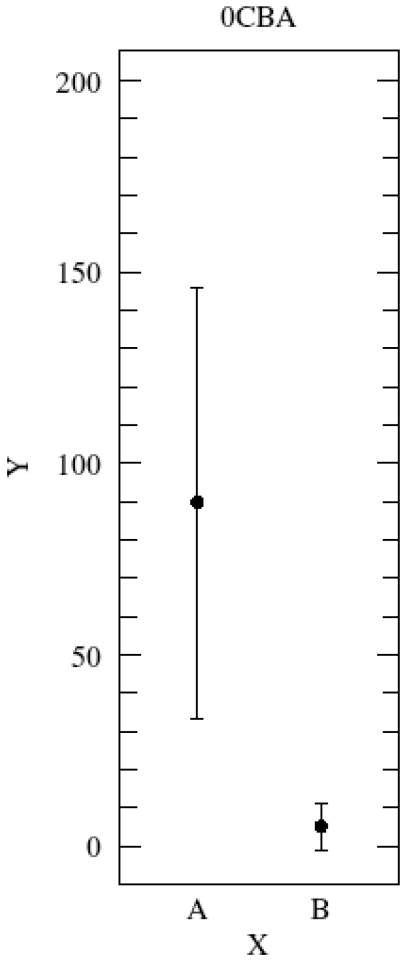


**Figure 1** Sperm concentration/ejaculate in a group treated with Buserelin (n = 15; A) and an untreated group (n = 15; B). Mean (circles) and SD (bars) are indicated as the number of sperm in millions per ejaculate. $p < 0.00001$.

consequently, it should be performed routinely during the orchidopexy.

In conclusion, with the supposition that hormonal treatment with LH-RH achieves successful testicular descent in only 20% of the cases, it should be, nevertheless, the first choice of treatment because it abrogates the necessity of subsequent surgery. In addition, in case of nonresponders of hormonal treatment, it facilitates orchidopexy and contributes considerably to reduced incidence of unilateral and more seriously bilateral complete postsurgical testicular atrophy. Furthermore, recognizing that the endocrinopathy of mini-puberty is responsible for ensuing infertility in cryptorchidism, hormonal treatment should be implemented in cryptorchid boys having had early successful orchidopexy but still having a risk of infertility later.

## References

1. Ritzen ME, Bergh A, Bjerknes R, Christiansen P, Cortes D, Haugen SE, et al. Nordic consensus on treatment of undescended testes. *Acta Paediatr* 2007; 96: 638–43.
2. Zivkovic D, Bica DG, Hadziselimovic F. Effects of hormonal treatment on the contralateral descended testis in unilateral cryptorchidism. *J Pediatr Urol* 2006; 2: 468–72.
3. Schwentner C, Oswald J, Kreczy A, Lunacek A, Bartsch G, Deibl M, et al. Neoadjuvant gonadotropin-releasing hormone therapy before surgery may improve the fertility index in undescended testes: a prospective randomized trial. *J Urol* 2005; 173: 974–7.
4. Hadziselimovic F, Emmons LR, Buser MW. A diminished postnatal surge of Ad spermatogonia in cryptorchid infants is additional evidence for hypogonadotropic hypogonadism. *Swiss Med Wkly* 2004; 134: 381.
5. Hadziselimovic F, Zivkovic D, Bica DT, Emmons LR. The importance of mini-puberty for fertility in cryptorchidism. *J Urol* 2005; 174 4 Pt 2: 1536–9; discussion 1538–9.
6. Hadziselimovic F, Herzog B. The importance of both an early orchidopexy and germ cell maturation for fertility. *Lancet* 2001; 358: 1156–7.
7. Hadziselimovic F, Hoecht B, Herzog B, Buser MW. Infertility in cryptorchidism is linked to the stage of germ cell development at orchidopexy. *Horm Res* 2007; 68: 46–52.
8. Zivkovic D, Bica DTG, Hadziselimovic F. Relationship between adult dark spermatogonia and secretory capacity of Leydig cells in cryptorchidism. *BJU*, 2007; in press.
9. Hadziselimovic F, Huff D, Duckett J, Herzog B, Elder J, Snyder H, et al. Treatment of cryptorchidism with low doses of buserelin over a 6-month period. *Eur J Pediatr* 1987; 146 Suppl 2: S56–8.
10. Hadziselimovic F. Successful treatment of unilateral cryptorchid boys risking infertility with LH-RH analogue. *Horm Res* 2007; submitted.

# Treatment of cryptorchidism

**Martin Ritzén (martin.ritzen@ki.se)**

Acta Paediatrica, Department of Woman and Child Health, Karolinska Institutet, Stockholm, Sweden

**Correspondence**
Martin Ritzén, Acta Paediatrica,
Building X5:01, Karolinska University Hospital,
SE-17176 Stockholm, Sweden.
Tel: |46-8-517-72465 | Fax: +46-8-517-74034 |
Email: martin.ritzen@ki.se

**Received**
12 June 2007; accepted 18 June 2007.

DOI: 10.1111/j.1651-2227.2007.00427.x

Sir,

Hadziselimovic and Zivkovic (1) object to the conclusions of the consensus group that hormones (human chorionic gonadotropins, hCG; or gonadotropin-releasing hormone, GnRH) should not be used as a primary treatment strategy for boys with cryptorchidism (2). Some of their arguments will be commented below, but details can be found in the other five separate articles in the May issue of *Acta Paediatrica* (3–7).

Hadziselimovic and Zivkovic bring up at least four issues:

1. They do not believe that the inflammatory changes and increased apoptosis that has been demonstrated after hCG treatment in boys as well as in experimental animals is of importance for future spermatogenesis. We arrived at different conclusions, being impressed by the strong correlation between the degree of apoptosis noted after hCG treatment in childhood and the 50% decrease in testicular volume in the same individuals when they were adult.
2. Hadziselimovic and Zivkovic claim that postoperative GnRH treatment of patients who at orchidopexy have been found to have poor spermatogenesis dramatically improves germ cell number and future sperm counts. We fully understand that gonadotropin stimulation of the prepubertal testes results in an increased number of germ cells during and immediately following gonadotropin administration. After all, this mimics the development in early puberty. However, long-term results are still not available. The data on adult outcome that Hadziselimovic and Zivkovic refer to are unpublished (ref. 10 in their letter is submitted for publication) and could not be evaluated by the consensus group. Figure 1 in their letter looks impressive, but no data on the study are given, for example, what was the age at treatment and follow-up, patient selection, randomization procedures, were there both uni- and bilateral cases? I cannot evaluate this figure without this information. The consensus group made the decision to await reports from other groups and from randomized controlled studies before recommending such treatment.
3. Hadziselimovic and Zivkovic believe that testicular biopsy should be performed as a routine procedure at orchidopexy. We recommend biopsy only as part of clinical studies, after due approval by ethical committees, because proof that the biopsy will alter the clinical management is still not convincing.
4. Accepting that hormonal treatment has very poor effect on testicular descent, Hadziselimovic and Zivkovic suggest that hormonal treatment should still be used as a primary treatment in order to facilitate orchidopexy in the 80% who do not respond and thus will undergo surgery. This might, in their opinion, reduce the number of postsurgical testicular atrophies. Although testicular atrophy may occur, it is a serious complication that is very rare in skilled surgical hands even without prior hormonal treatment. We therefore emphasize that surgery of infant boys should only be done by paediatric surgeons/urologists.

In medicine, no recommendations on treatment are forever. When new convincing data are presented, the recommendations will be modified. But every day, large numbers of boys are evaluated for cryptorchidism, and decisions have to be taken. The present recommendations by the Nordic Consensus Group are based on the current literature. I recommend the readers to consult the six articles and the commentary of Professor Hutson (8) in the May issue of *Acta Paediatrica* to find a comprehensive review of the field.

## References

1. Hadziselimovic F, Zivkovic D. Is the prohibition of hormonal treatment for cryptorchidism, as suggested by the Nordic consensus group, justifiable? *Acta Paediatr* 2007; 96: 1368–9.
2. Ritzen ME, Bergh A, Bjerknes R, Christiansen P, Cortes D, Haugen SE, et al. Nordic consensus on treatment of undescended testes. *Acta Paediatr* 2007; 96: 638–43.
3. Virtanen HE, Bjerknes R, Cortes D, Jørgensen N, Rajpert-De Meyts E, Thorsson AV, et al. Cryptorchidism: classification, prevalence and long-term consequences. *Acta Paediatr* 2007; 96: 611–6.
4. Bergh A, Söder O. Studies of cryptorchidism in experimental animal models. *Acta Paediatr* 2007; 96: 617–21.
5. Virtanen HE, Cortes D, Rajpert-De Meyts E, Ritzén ME, Nordenskjöld A, Skakkebaek NE, et al. Development and descent of the testis in relation to cryptorchidism. *Acta Paediatr* 2007; 96: 622–7.
6. Thorsson AV, Christiansen P, Ritzén M. Efficacy and safety of hormonal treatment of cryptorchidism: current state of the art. *Acta Paediatr* 2007; 96: 628–30.
7. Thorup J, Haugen S, Kollin C, Lindahl S, Läckgren G, Nordenskjöld A, et al. Surgical treatment of undescended testes. *Acta Paediatr* 2007; 96: 631–7.
8. Hutson JM. Treatment of undescended testes–time for a change in European tradition. *Acta Paediatr* 2007; 96: 608–10.

 

# Fourth case of uterine aplasia, ovarian dysgenesis, amenorrhea and impuberism: a variant of Mayer-Rokitansky-Kuster-Hauser syndrome

Marina Colombani[1], Daniel Cau[2], Thauvin-Robinet[1], Emmanuel Sapin[3], Frédéric Huet[4], Laurence Faivre (laurence.faivre@chu-dijon.fr)[1]

1.Département de Génétique, Hôpital d'Enfants, CHU Dijon, France
2.Service de Pédiatrie et de Néonatalogie, Centre Hospitalier, Chalon, France
3.Service de Chirurgie Pédiatrique, Hôpital d'Enfants, Dijon, France
4.Département de Pédiatrie, Hôpital d'Enfants, Dijon, France

**Correspondence**
Laurence Faivre, Centre de Génétique, Hôpital d'Enfants 10, bd Maréchal De Lattre de Tassigny, 21034 Dijon, France.
Tel: +33.3.80.29.33.00 | Fax: +33.3.80.29.32.66 |
Email: laurence.faivre@chu-dijon.fr

**Received**
9 March 2007; revised 19 April 2007; accepted 21 May 2007.

DOI: 10.1111/j.1651-2227.2007.00404.x

To the Editor:

Mayer-Rokitansky-Kuster-Hauser syndrome (MRKH) is characterized by the association of congenital absence of uterus, rudimentary vagina, normal tubes and ovaries, normal female secondary sexual characteristics, and normal endocrine and cytogenetic evaluations. Some cases associating absence of uterus, lack of puberty with primary amenorrhea, gonadal dysgenesis or agenesis with normal 46,XX female karyotype have been described in the literature (1–3). The hypotheses of coincidental association or a new variant of MRKH syndrome have been raised.

Here we report the case of a 15-year-old girl presenting lack of puberty and primary amenorrhea. She was the third child of consanguineous parents of Senegalese origin. Her twin brother had normal puberty as did her older sister (menarche at the age of 14 years). She was born at 38 weeks of gestation with a birth length of 45 cm and weight of 2040 g. Her past medical history included autoimmune thyroiditis with secondary hypothyroidism. At the time of examination, her height was 168 cm, and her weight was 58 kg with a normal body mass index. Assessment of the secondary sexual characteristics showed absence of breast development and of pubic and axillary hair (Tanner stage 1). There were no signs of Turner syndrome. There was no pelvic pain. Gynaecological examination revealed prepubertal external genitalia and an apparently normal vagina ending in a blind pouch. There was no sign of masculinisation and she had normal psychomotor development. Basal and dynamic endocrine tests revealed hypergonadotropic hypogonadism [follicle-stimulating hormone 55 mIU/L (n = 3.3–11.3 mIU/L), luteinising hormone 21.7 mIU/L (n = 2.4–12.6 mIU/L) and 17-beta-estradiol 3.54 pmol/L (n = 6.8–27.2 pmol/L)]. Antimullerian hormone and antiovarian antibodies were undetectable, inhibin B < 15 pg/mL and low levels of testosterone metabolites were found [testosterone 0.34 nmol/L (n = 0.75 ± 0.17 nmol/L), delta-4-androstenedione 0.47 nmol/L (n = 2.73 ± 1.09 nmol/L) and dihydrotestosterone 0.15 nmol/L (n = 0.52 ± 0.20 nmol/L)]. Standard cytogenetic examination revealed a normal female karyotype, 46,XX, with the absence of any Y material detected by fluorescent in situ hybridisation studies. Cardiac and abdominal ultrasounds were normal. Delayed bone age was noted ($13^1/_2$ years for a chronological age of $15^1/_2$ years). Pelvic ultrasound showed complete absence of uterus and gonads. Laparoscopic examination revealed two ovarian streaks suggesting gonadal dysgenesis, normal fallopian tubes and absent uterus. Vaginal length was normal (6.5 cm). Streaks were not removed. Following gynaecological examination, substitution with oestrogen and gestagen were given with satisfactory results.

MRKH syndrome is diagnosed at puberty in 1 out of 4500 women because of amenorrhea and is usually reported as sporadic (4). Congenital absence of the upper vagina and uterus with normal fallopian tubes and ovaries are prime features of the disease. MRKH syndrome is sometimes associated with renal abnormalities or skeletal malformations, and in such cases named the MURCS association (MUllerian Cervical Renal Somite; 4). The cause of both entities remains unknown at the present time. Some cases with MRKH and gonadal dysgenesis have been described in association with a cytogenetic abnormality, with X chromosome rearrangement or a 46, XY karyotype (5).

To date, three atypical cases have been described in the literature, associating absence of the uterus with gonadal dysgenesis or agenesis and normal female karyotype (1–3), one of which also associated preaxial polydactyly and a single pelvic kidney (2; Table 1). The authors discussed whether such cases were a rare variant of MRKH or a coincidental association (3). The description of this fourth case supports the hypothesis of a genuine entity with a different pathogenesis from that of MRKH. The hypothesis of undifferentiated gonads in the embryonic period with the transient secretion of antimullerian hormone can be raised, but remains questionable in the absence of material originating from the Y chromosome. Histological and chromosome studies of the streak gonads would have been of help but were not avail-

**Table 1** Review of the three cases with absence of uterus, impuberism and primary amenorrhea, gonadal dysgenesis or agenesis with normal 46,XX female karyotype

| | Alper et al., 1985 | Gorgojo et al., 2002 | Marrakchi et al., 2004 | Present case |
|---|---|---|---|---|
| Age | 16 years | 17 years | 19 years | 15 years |
| Primary amenorrhea | + | + | + | + |
| Impuberism | + | + | + | + |
| Gonadal abnormalities | Bilateral ovarian dysgenesis | Bilateral ovarian agenesis | Bilateral ovarian dysgenesis | Bilateral ovarian dysgenesis |
| Vagina | Normal | Normal | Normal | Normal |
| Other features | − | Single pelvic kidney, preaxial polydactyly | − | − |
| Hypergonadotropic hypogonadism | + | + | + | + |
| Hypothyroidism | − | + | − | + (autoimmune) |
| Karyotype | 46,XX | 46,XX | 46,XX | 46,XX |

able in these cases. The possibility of an XY cell line in the streaks cannot be excluded.

In conclusion, the association of uterine aplasia, ovarian dysgenesis, amenorrhea, impuberism and normal karyotype appears to be a genuine entity but its pathophysiological mechanism remains unknown and indicate further investigations in future cases.

## References

1. Alper MM, Garner PR, Spence JE. Coexistence of gonadal dysgenesis and uterine aplasia. A case report. *J Reprod Med* 1985; 30: 232–4.
2. Gorgojo JJ, Almodovar F, Lopez E, Donnay S. Gonadal agenesis 46,XX associated with the atypical form of Rokitansky syndrome. *Fertil Steril* 2002; 77: 185–7.
3. Marrakchi A, Gharbi M, Kadiri A. Gonadal dysgenesis associated with Mayer-Rokitansky-Hauser syndrome: a case report. *Ann Endocrinol* 2004; 65: 446–68.
4. Guerrier D, Mouchel T, Pasquier L, Pellerin I. The Mayer-Rokitansky-Kuster-Hauser syndrome (congenital absence of uterus and vagina)–phenotypic manifestations and genetic approaches. *J Negat Results Biomed* 2006; 5: 1–8.
5. Aydos S, Tunkun A, Bokesoy I. Gonadal dysgenesis and the Mayer-Rokitansky-Kuster-Hauser syndrome in a girl with 46,X,del(X)(pter–>q22:). *Arch Gynecol Obstet* 2003; 267: 173–4.

# Acute scrotum and Henoch–Schönlein purpura

**Kjetil Søreide (ksoreide@mac.com)**

Acute Care Medicine Research Network, University of Stavanger, Department of Surgery, Stavanger University Hospital, POB 8100, N-4068 Stavanger, Norway

**Correspondence**
Acute Care Medicine Research Network,
University of Stavanger, Department of Surgery,
Stavanger University Hospital,
POB 8100, N-4068 Stavanger, Norway.
Tel: 5151 9566 | Fax: 5151 9910 |
Email: ksoreide@mac.com

**Received**
14 May 2007; accepted 22 May 2007.

DOI: 10.1111/j.1651-2227.2007.00409.x

Sir,

I read with interest the recent article by Ha and Lee (1) on the scrotal involvement in children with Henoch–Schonlein purpura (HSP). They found scrotal involvement in 22% of boys, which is somewhat higher than the overall 13% found in a collective review of >600 boys with HSP (2). Although Ha and Lee (1) reported one exploration (1/26 = 4%), the overall negative exploration rate has been reported to be about 23% (2). It would be of interest to know how many of the children were referred for surgical evaluation in their study, and whether they investigated 'acute scrotum' with or without surgical exploration in surgical wards as well.

HSP is a condition seen (or even overseen) from time to other by surgeons on call, or in the clinical workup of an 'acute scrotum' among children. Thus, knowledge of the condition is a prerequisite for proper diagnosis (and avoidance of unnecessary surgery) both among paediatricians and surgeons. Of note, scrotal pain as symptom may occur well into adolescent age (1) and even several months after the

 

primary diagnosis of HSP (3). Obviously, the presentation of an acute scrotum in childhood includes a myriad of diagnostic possibilities. Torsion of the testis is the single most important condition to rule out because there may only be a 6- to 12-h period available to save the testis once torsion has occurred. Thus, all other differentials should be considered secondarily in the evaluation of an acute scrotum. Although torsion of the testis occurs most commonly during puberty (mean age 11–12 years), the average age of children with HSP and scrotal symptoms is 5–7 years (2). However, both entities show a considerable overlap, thus making age a poor diagnostic marker. As clinical presentation and diagnosis are difficult, awareness of this coexisting conditions is of value, as noted by Ha and Lee (1).

The short-term onset of severe scrotal pain associated with nausea and vomiting is highly suggestive of testicular torsion. However, up to 50% of children with HSP are reported to experience nausea and vomiting. A tender scrotum, spermatic cord shortening and cremasteric muscle spasm are clinical signs of testicular torsion and should advocate exploration. On the contrary, swelling including both hemiscrota and penis, moderate (in contrast to severe) pain, a positive cremaster reflex and an associated rash or presence of arthralgia, is highly suggestive of HSP as the underlying cause of scrotal symptoms (2). Scrotal pain may present before the rash occurs or even long time after it has disappeared (3), thus sometimes making the association with HSP difficult. Children with HSP who have scrotal symptoms, lack a rash, and have no arthralgia or haematuria are more likely to undergo exploration. Yet, still, no true testicular torsion in HSP has been reported since 1974 (4).

## References


1. Ha TS, Lee JS. Scrotal involvement in childhood Henoch-Schonlein purpura. *Acta Paediatr* 2007; 96: 552–5.
2. Søreide K. Surgical management of nonrenal genitourinary manifestations in children with Henoch-Schonlein purpura. *J Pediatr Surg* 2005; 40: 1243–7.
3. Søreide K, Ansorge C, Øgreid P. Skrotal smerte og Henoch-Schonlein purpura. *Tidsskr Nor Laegeforen* 2004; 124: 335–6.
4. Loh H, Jalan O. Testicular torsion in Henoch-Schonlein syndrome. *BMJ* 1974; 2: 96–7.


# How much we worry for liver fat in children?


**Melania Manco (melaniamanco@tiscali.it), Matilde Marcellini, Valerio Nobili**

Department of Hepato-Gastroenterology and Nutrition, Bambino Gesù Hospital and Research Institute, Rome, Italy

**Correspondence**
Melania Manco, Department of Hepato-Gastroenterology and Nutrition, Bambino Gesù Hospital and Research Institute, Largo S. Onofrio 4, 00165 Rome, Italy.
Email: melaniamanco@tiscali.it
Fax: +3906 3550 7025



**Received**
21 May 2007; accepted 11 June 2007.

DOI: 10.1111/j.1651-2227.2007.00432.x


Sir,

We read with great interest the paper by Lucia Pacifico and co-authors in the recent issue of the journal (1). Although we enjoyed the study, we cannot agree with their conclusions. They claim the superiority of the magnetic resonance imaging (MRI) in the clinical management of children with fatty liver as compared with sonography. MRI is an operator-independent technique able to insure a better monitoring of young hepatic steatosis in the follow-up.

In 84 children (age 3–18 years) with biopsy-proven fatty liver disease, weight loss and physical exercise are able leading steatosis as measured by liver brightness to completely disappear (2). Thus, ultrasound seems to be an inexpensive and easy-to-perform technique to monitor simple fatty liver, not requiring conscious sedation as MRI does. Ultrasound is able to discriminate moderate from severe steatosis, although it cannot distinguish between absent and mild stages (fig. 2 in the manuscript of Pacifico et al.; 1). On the other hand, in 26% of patients (2), simple fatty liver gets complicated in nonalcoholic fatty liver disease (NASH) by necroinflammation and fibrosis. MRI cannot give information about histology. Therefore, we doubt whether it is worth performing MRI in patients with fatty liver. Necroinflammation and fibrosis are more important than steatosis in the clinical management of the disease. Apart from metabolic consequences (i.e. the impact on the hepatic insulin resistance), steatosis cannot lead to cirrhosis as necroinflammation and fibrosis do. Compared to MRI, liver biopsy may be inexpensive, safe when done by experienced physicians, not time consuming, meaningful for the long-term follow-up even though it may require conscious sedation as well, at least in toddlers and younger kids (3).

The lack of any relation observed by the authors (1) between total body fat and hepatic content of fat is not surprising, but again we would like to report our experience (4). The amount of circulating active leptin (and not total leptin, which the authors refer to) increases as steatosis and inflammation worsen.

Taking into account that fatty liver disease is becoming a serious hazard for children health worldwide, we believe that management and follow-up of fatty liver disease require standardized procedures, which are easy to perform,

reproducible and not expensive to the community, even though any speculative investigation is valuable.

## References

1. Pacifico L, Celestre M, Anania C, Paolantonio P, Chiesa C, Laghi A. MRI and ultrasound for hepatic fat quantification: relationships to clinical and metabolic characteristics of pediatric nonalcoholic fatty liver disease. *Acta Paediatr* 2007; 96: 542–7.
2. Nobili V, Marcellini M, Devito R, Ciampalini P, Piemonte F, Comparcola D, et al. NAFLD in children: a prospective clinical-pathological study and effect of lifestyle advice. *Hepatology* 2006; 44: 458–65.
3. Nobili V, Comparcola D, Sartorelli MR, Natali G, Monti L, Falappa P, et al. Blind and ultrasound-guided percutaneous liver biopsy in children. *Pediatr Radiol* 2003; 33: 772–5.
4. Nobili V, Manco M, Ciampalini P, Diciommo V, Devito R, Piemonte F, et al. Leptin, free leptin index, insulin resistance and liver fibrosis in children with non-alcoholic fatty liver disease. *Eur J Endocrinol* 2006; 155: 735–43.

# How do we care for children with fatty liver disease?

Lucia Pacifico[1,2], Michela Celestre[3], Caterina Anania[1], Andrea Laghi[3], Claudio Chiesa (claudio.chiesa@uniroma1.it)[1,2]

1.Department of Paediatrics, La Sapienza University of Rome, Italy

2.National Research Council, Rome, Italy

3.Department of Radiological Sciences, La Sapienza University of Rome, Italy

**Correspondence**
Claudio Chiesa, La Sapienza University of Rome – Pediatrics,
Viale Regina Elena, 324, I-00161 Rome, Italy.
Tel: +39-06-4997-9216 | Fax: +39-06-4997-9215 |
Email: claudio.chiesa@uniroma1.it

**Received**
5 June 2007; accepted 12 June 2007.

DOI: 10.1111/j.1651-2227.2007.00423.x

Sir,

We thank Manco, Marcellini and Nobili (1) for raising the concerns that they have regarding our recent publication (2) and, in turn, we reply as follows:

These correspondents refer to the reliability of MRI versus ultrasound for monitoring children with fatty liver disease. They dispute our suggestion that MRI provides a more objective means than ultrasound to discriminate differences in hepatic fat content. However, their policy to advocate the use of ultrasound in the identification of hepatic fat regression or accumulation does not seem to be based on solid evidence.

Simply acknowledging that 'in 84 children with biopsy-proven fatty liver disease, weight loss and physical exercise are able leading steatosis as measured by liver brightness to completely disappear' (3) as well as simply concluding 'ultrasound seems to be an inexpensive and easy to perform technique to monitor simple fatty liver, not requiring conscious sedation as MRI does' is not free from flaws. First, the absence of brightness on ultrasound may underestimate the clinical course because ultrasonographic changes do appear at a hepatocyte fat content of $\geq$15–30% (4). On the other hand, the presence of brightness per se including no broad categorization (e.g. mild, moderate and severe)—as advocated by Manco et al. (1)—would further complicate the utility of ultrasound by its incapacity to identify true fat regression or accumulation systematically over the clinical course of any child with fatty liver (5). We therefore challenge these correspondents to reanalyze their own data in order to demonstrate the utility of hepatic ultrasound, in comparison with liver biopsy, for the quantitative assessment of the degree of fatty involvement (e.g. mild, moderate, and severe) of the liver in their children with biopsy-proven nonalcoholic fatty liver disease (NAFLD). The suggestion by these correspondents that the 'gross' presence or absence of brightness delineates the wide spectrum of fat severity is a conjecture.

Second, Manco et al. argue that our article 'enshrines' the notion that ultrasound was able to discriminate moderate from severe steatosis, although it was not able to distinguish between absent and mild stages (2). We fear that Manco et al. have failed to understand the clear results of our publication (2). Indeed, the points of our study were that ultrasound is not able to distinguish between moderate and severe degree of fatty liver, and that ultrasound is lacking in identifying true slight (or mild) alterations of hepatic fat content. In fact, the mean hepatic fat fraction in children with severe steatosis was not statistically different from that found in patients with moderate steatosis. Furthermore, in children with mild steatosis severity by ultrasound, the mean MRI hepatic fat fraction was very low and similar to the minimal levels encountered in children with no ultrasound hepatic steatosis (2).

Third, we agree with Manco et al. that MRI is not effective in identifying individuals with hepatic necroinflammation and fibrosis. However, this also holds true for ultrasound. On the other hand, Manco et al. must agree that hepatic fibrosis can limit the ability of ultrasound to grade hepatic

 

steatosis (4), whereas hepatic MRI, based upon chemical shift imaging, is not influenced by the presence of fibrosis in the accurate quantification of the hepatic fat content (5).

Fourth, Manco and colleagues claim that the clinical use of MRI in monitoring children with hepatic steatosis is limited because of the need for conscious sedation (2). Those who read our study will have seen that hepatic MRI involving fast gradient echo did not require in our (compliant) children conscious sedation. In fact, the sequence of scan parameters allows simultaneous acquisition of both in-phase and out-of-phase images during the multibreath-hold interval required to cover the entire liver.

Fifth, we do agree that liver biopsy remains an important tool in the diagnostic process in patients with NAFLD, but its role for diagnosis of NAFLD in children has yet to be established (6). Manco et al. must also be aware that there are important limitations in liver biopsy to be considered. The basic assumption that the small fragment collected through percutaneous liver biopsy is representative of overall hepatic involvement has been seriously challenged. A needle biopsy sample usually represents around 1/50 000 of the total mass of the liver (7). In addition, multiple studies have been published showing considerable sampling variability for most histologic features (8,9). Ratziu et al. compared histologic findings in 51 patients with NAFLD, each of whom had two samples collected through percutaneous liver biopsy (10). No features displayed high agreement, substantial agreement was only seen for steatosis grade, moderate agreement was seen for hepatocyte ballooning and perisinusoidal fibrosis, and lobular inflammation displayed only slight agreement. Six of 17 patients with bridging fibrosis (35%) on one sample had only mild or no fibrosis on the other and therefore could have been under staged with only one biopsy. Ratziu et al. concluded that histologic lesions of NASH were unevenly distributed throughout the liver parenchyma, and that sampling error of liver biopsy can therefore result in substantial misdiagnosis and staging inaccuracies (10). Merriman et al., through a careful comparison of paired lobar biopsies in subjects at high risk of NAFLD, have also shown significant sampling variability in NAFLD (11). In their study, agreement for steatosis was excellent, moderate for fibrosis and only fair for most components of necroinflammation. This variability can have an important impact on the diagnostic performance of liver biopsy specimens, as well as in the staging or grading of hepatic disease.

Also, liver biopsy is an invasive procedure, and not suitable for repeated evaluations.

Finally, Manco et al. seem to fall into an awkward 'trap' regarding their argument that we did not find a correlation between (total) leptin concentrations and fatty liver. This is also in line with other recent studies showing no correlation between (total) leptin and obesity-related liver disease (6). Manco et al. argue that failure to show such relationship might have been overcome by testing active leptin (or free leptin index). However, we are very surprised that Manco et al. have forgotten that 'higher (total) leptin correlated with more severe steatosis, ballooning and NAS score ($r = 0.6$, 0.4 and 0.6, respectively; for all $P < 0.001$); free leptin index with ballooning ($r = 0.4$, $P < 0.0001$), steatosis ($r = 0.5$, $P < 0.0001$) and NAS score ($r = 0.5$, $P < 0.0001$)', which is what the recent paper they have themselves published, advocates (12).

## References


1. Manco M, Marcellini M, Nobili V. How much we worry for liver fat in children? *Acta Paediatr* 2007; 96: 1373–4.
2. Pacifico L, Celestre M, Anania C, Paolantonio P, Chiesa C, Laghi A. MRI and ultrasound for hepatic fat quantification: relationships to clinical and metabolic characteristics of pediatric nonalcoholic fatty liver disease. *Acta Paediatr* 2007; 96: 542–7.
3. Nobili V, Marcellini M, Devito R, Ciampalini P, Piemonte F, Comparcola D, et al. NAFLD in children: a prospective clinical-pathological study and effect of lifestyle advice. *Hepatology* 2006; 44: 458–65.
4. Siegelman ES, Rosen MA. Imaging of hepatic steatosis. *Semin Liver Dis* 2001; 21: 71–80.
5. Fishbein M, Castro F, Cheruku S, Jain S, Webb B, Gleason T, et al. Hepatic MRI for fat quantification. Its relationship to fat morphology, diagnosis, and ultrasound. *J Clin Gastroenterol* 2005; 39: 619–25.
6. Iorio R, Sepe A, Giannattasio A, Cirillo F, Spagnuolo MI, Franzese A, et al. Immune phenotype and serum leptin in children with obesity-related liver disease. *J Clin Endocrinol Metab* 2006; 91: 341–4.
7. Bravo AA, Sheth SG, Chopra S. Liver biopsy. *N Engl J Med* 2001; 344: 495–500.
8. Maharaj B, Maharaj RJ, Leary WP, Cooppan RM, Naran AD, Pirie D, et al. Sampling variability and its influence on the diagnostic yield of percutaneous needle biopsy of the liver. *Lancet* 1986; 1: 523–5.
9. Regev A, Berho M, Jeffers LJ, Milikowski C, Molina EG, Pyrsopoulos NT, et al. Sampling error and intraobserver variation in liver biopsy in patients with chronic HCV infection. *Am J Gastroenterol* 2002; 97: 2614–8.
10. Ratziu V, Charlotte F, Heurtier A, Gombert S, Giral P, Bruckert E, et al. Sampling variability of liver biopsy in nonalcoholic fatty liver disease. *Gastroenterology* 2005; 128: 1898–906.
11. Merriman RB, Ferrell LD, Patti MG, Weston SR, Pabst MS, Aouizerat BE, et al. Correlation of paired liver biopsies in morbidly obese patients with suspected nonalcoholic fatty liver disease. *Hepatology* 2006; 44: 874–80.
12. Nobili V, Manco M, Ciampalini P, Diciommo V, Devito R, Piemonte F, et al. Leptin, free leptin index, insulin resistance and liver fibrosis in children with non-alcoholic fatty liver disease. *Eur J Endocrinol* 2006; 155: 735–43.

# Transanal intestinal evisceration from swimming pool skimmer suction: a spur to prevention

Enrico Valletta (enrico.valletta@azosp.vr.it)[1], Nicola Zampieri[2], Martina Fornaro[1], Paolo Biban[3], Stefano Marzini[3], Francesco S Camoglio[2]

1.Department of Pediatrics, Policlinico 'G.B.Rossi', University of Verona, Italy

2.Department of Surgical Sciences, Pediatric Surgical Unit, Policlinico 'G.B.Rossi', University of Verona, Italy

3.Pediatric Intensive Care Unit, Ospedale Civile Maggiore, Verona, Italy

**Correspondence**
Enrico Valletta, Pediatric Department,
Policlinico 'G.B. Rossi',
P.zzale L.A. Scuro 1, I-37134, Verona, Italy.
Tel: +39-45-807-47-44 | Fax: +39-45-82-00-993 |
Email: enrico.valletta@azosp.vr.it

**Received**
6 May 2007; accepted 30 May 2007.

DOI: 10.1111/j.1651-2227.2007.00418.x

Entrapment in swimming pool drain systems is a rare event that can have devastating consequences when intestinal herniation occurs from transanal suction. When the child's anal region adheres to an uncovered drain, the vacuum produced by the pump can cause relaxation of the anal sphincter and transanal evisceration of the child's bowel. As far as we know there are only 12 cases reported in the literature (1–8). Here we describe a girl who needed resection of a large part of the intestine following intestinal suction caused by an uncovered pool skimmer. Preventive measures to avoid similar accidents are briefly discussed.

A 17-month-old girl, remained entrapped with her anal region adhering to a drain missing its protective cover while sitting on the edge of a private pool. On arrival at the hospital, the girl was prepared for an emergency surgical intervention presenting evisceration of jejunum, ileum, small bowel, caecum and appendix through an anterior rectosigmoid laceration. The last ileal loop, the caecum and half of the transverse colon were torn away from their mesentery and were resected. At surgical second look, 72 h later, the whole median ileal portion (about 240 cm), which appeared necrotic, was resected leaving about 100 cm of residual intestine. After 20 days the intestine was recanalized by performing a terminolateral anastomosis between the first ileal loop and the transverse colon. Parenteral nutrition (PN) was associated with nighttime enteral administration of protein hydrolysate and spontaneous nutrition during daytime. Therapy included ursodeoxycholic acid, proton pump inhibitors, antibiotics, colestyramin, polyvitaminic complex and oligoelements. At day 51 following surgery the girl was dismissed on home enteral nutrition (EN) and spontaneous nutrition during daytime. Eight days later, she was hospitalized again due to weight loss and severe enterocolitis. Abdominal X-ray indicated fluid levels and pneumatosis intestinalis, confirmed by a CT scan performed 24 h later. Stool cultures were positive for *E. coli* and *K. pneumoniae* and negative for *C. difficile* toxin. The patient was treated with bowel rest, PN and intravenous antibiotics. After 20 days, the girl was dismissed from the hospital on home PN/EN. No histological lesions were observed at colonoscopy. Faecal continence was preserved. Ten months after the accident the girl is still on home PN (30% of daily energy intake, five times a week) plus EN with commercial formula. Oral intake is allowed for a wide range of food, with an alvus of 5–7/day. Weight gain is constant.

In the girl we described, laceration of the intestinal wall due to transanal suction occurred in three specific areas: ileum, transverse colon and sigma-rectum junction. The latter caused intestinal evisceration. At the end of the surgical second look the remaining intestine was about 100-cm long without the ileocecal valve. At least 6 out of 12 cases reported in the literature completely or partially depended on PN and in other 2 cases PN was used for 3 and 8 months, respectively (Table 1). In our patient, 10 months after the starting of home PN, better tolerance of enteral/oral intakes indicates that, within few months, PN withdrawal could be possible.

In the United States, governmental authorities are well aware of the risk represented by drain entrapment (9). Accidental removal of safety covers of pool drains and skimmers represent the most dangerous situations for small children who, intrigued by the water flow, are sucked up by a suction power as strong as 160 kg (800 psi) for a 20-cm drain (1). If the child's buttocks remain entrapped in the drain, prolapse of the rectal mucosa, evisceration or laceration of the rectum may occur within seconds. Should this be the case, it is imperative to switch off immediately the pump power supply. On the other side, there is not yet full awareness of the possible dangers among pool users and owners. In the United States, among 4500 adults with children aged $<$14 years, risks related to suction systems were completely ignored in 29% of cases and only 15% of pool owners had antivortex drain covers and safety vacuum release systems (9). Only 23% of 43 sample pools in Cyprus and Gran Canaria complied with safety regulations (2) despite the strict safety standards established by law after some tragic events in the early 1990s (9,10). Installation of surface-skimming systems instead of submerged suction outlets, piping two or

 

**Table 1** Published cases of transanal suction from drains in swimming facilities

| Author | Age (years) | Residual intestine | Intact ileocecal valve | Parenteral nutrition dependent |
|---|---|---|---|---|
| Cain et al. (1) | 4 | Jejunum, proximal ileum, 20-cm distal ileum and colon | Yes | No |
| Cain et al. (1) | 4 | 50-cm small intestine and colon | Yes | Yes for 3 months |
| Cain et al. (1) | 5 | 3 cm of proximal and 3 cm of distal small intestine | Yes | Yes |
| Cain et al. (1) | 1.5 | 5-cm jejunum and 9-cm ileum | Yes | Yes (80%) |
| Cain et al. (1) | 4 | Duodenum and colon | No | Yes |
| Debeugny et al. (3) | 3 | All (small rectal resection) | Yes | No |
| Shorter et al. (8) | 3 | All | Yes | No |
| Scott Hultman and Morgan (7) | 5 | 45-cm jejunum and colon from the splenic flexure | No | Yes |
| Porter et al. (6) | 3 | Extensive small bowel resection | NA | Yes |
| Pomberger et al. (5) | 4 | 35-cm small intestine | Yes | Yes for 8 months |
| Gomez-Juarez et al. (4) | 16 | Duodenum (small rectal and transverse colon resection) | No | Yes |
| Davison and Puntis (2) | 6 | All | Yes | No |
| Present case | 1.5 | 100-cm jejunum and colon from the hepatic flexure | No | Yes (30%) after 10 months |

NA: information not available.

three separated outlets to a single suction pump, shaping outlets to avoid blockage by any body part, pressure-limiting switches and use of approved covers/grates are all measures that could prevent child entrapment in drain systems. An increased awareness of specific safety issues, among parents and pool owners, is therefore considered of paramount importance.

**ACKNOWLEDGEMENT**

We thank Alessia Rocchi for her help in editing the manuscript.

## References

1. Cain WS, Howell CG, Ziegler MM, Finley AJ, Asch MJ, Grant JP. Rectosigmoid perforation and intestinal evisceration from transanal suction. *J Pediatr Surg* 1983; 18: 10–3.
2. Davison A, Puntis JWL. Awareness of swimming pool suction injury among tour operators. *Arch Dis Child* 2003; 88: 584–6.
3. Debeugny P, Bonnevalle M, Besson R, Basset T. A recto-sigmoid lesion due to trans-anal aspiration. Apropos of a case. *Chir Pediatr* 1990; 31: 191–4.
4. Gomez-Juarez M, Cascales P, Garcia-Olmo D, Gomez-Juarez F, Usero S, Capilla P, et al. Complete evisceration of the small intestine through a perianal wound as a result of suction at a wading pool. *J Trauma* 2001; 51: 398–9.
5. Pomberger G, Hallwirth U, Pumberger W, Horcher E. Short-bowel syndrome associated with subtotal necrosis of small intestine after rectal trauma. *Eur J Pediatr Surg* 1999; 9: 251–2.
6. Porter ES, Kohlstadt IC, Farrell KP. Preventing wading pool suction-drain injures. *Md Med J* 1997; 46: 297–8.
7. Scott Hultman C, Morgan R. Transanal intestinal evisceration following suction from an uncovered swimming pool drain: case report. *J Trauma* 1994; 37: 843–7.
8. Shorter NA, Woodell JP, Cole TB, Hayes JA, MacCormack JN. Suction-drain injury in a public wading pool. *MMWR Morb Mortal Wkly Rep* 1992; 41: 333.
9. Quraishi AY, Morton S, Cody BE, Wilcox R. *Pool and spa drowning: a national study of drain entrapment and pool safety measures*. Washington, DC: Safe Kids Worldwide, 2006.
10. American National Standards Institute and The Association of Pool and Spa Professionals. *American nation standard for suction entrapment avoidance in swimming pools, wading pools, spas, hot tubes, and catch basins*. Alexandria, VA: ANSI/APSP 2006.

# Hospitalization for asthma and use of inhaled steroids

**Kaj Korhonen[1], Matti Korppi (matti.korppi@uta.fi)[2]**

1.Department of Paediatrics, Kuopio University and University Hospital, Kuopio, Finland
2.Paediatric Research Centre, Tampere University and University Hospital, Tampere, Finland

**Correspondence**
Matti Korppi, Pediatric Research Centre,
Tamepere University and University Hospital,
FIN-33014 Tampere, Finland.
Tel: +358-3-3551-8407 |
Fax: +358-3-3551-8420 |
Email: matti.korppi@uta.fi

**Received**
4 June 2007; accepted 14 June 2007.

DOI: 10.1111/j.1651-2227.2007.00431.x

**Table 1** Mean incidences of hospitalizations for asthma, and use of inhaled steroids, in two child populations less than 24 months of age, during the 5-year study period 1995–1999

| | Kuopio area (n = 5490) | Oulu area (n = 9914) | p |
|---|---|---|---|
| All admissions | 7.9/1000 | 8.7/1000 | <0.05 |
| First admission | 5.6/1000 | 5.2/1000 | NS |
| Re-admissions | 2.3/1000 | 3.5/1000 | <0.001 |
| Number of children on inhaled steroids in the population | 375 (6.8%) | 637 (6.4%) | |

Statistical significance was estimated by standardized incidence ratios and related 95% confidence intervals. First admission means an annual first admission; re-admission means the second or subsequent admission in each year. Steroid consumption data were based on purchases of prescribed medicines.

Sir,

Säynätkangas et al. published in a recent issue of *Acta Paediatrica* an interesting, retrospective analysis on asthma hospitalization trends in Finnish children (1). They found that hospitalization rates for asthma constantly declined during the 8-year surveillance period, from 3.9 per 1000 in 1996 to 1.8 per 1000 in 2004. The trend was similar in both boys and girls, though the figures in boys were significantly higher. The re-admission rates (rates of all hospitalizations minus rates of first hospitalizations) were 2.0 per 1000 in 1996 and 0.8 per 1000 in 2004. The authors proposed that this beneficial trend was due to the national asthma programme implemented in 1994. The main message of this programme was an early asthma diagnosis and an early onset of maintenance medication, usually inhaled steroids for patients with definite or evident asthma (2).

The hospitalization data were collected from the national hospital discharge register by the code 493 [international classification of diseases (ICD 8)] until 1995, and by the codes J45 and J46 (ICD 10) from 1996 to 2004 (1). The authors also evaluated the numbers of children hospitalized for bronchitis by the codes J40–44, and found that their number was less than 2.5% of the number of children hospitalized for asthma, thus not causing any bias to the analyses and results. However, the most important confounding diagnosis, especially in young children, is obstructive bronchitis (wheezy bronchitis) coded as 466 until 1995 and as J21.9 from 1996 onwards. In fact, there often are no objective means to separate asthma from obstructive bronchitis in children under school age. In some patients, especially in the youngest age groups, the diagnosis of asthma is delayed, and hospitalizations for evident asthma are recorded as hospitalizations for obstructive bronchitis. In addition, the diagnosis of obstructive bronchitis is erroneously used to describe acute wheezing associated with respiratory infections also in children with present doctor-diagnosed asthma. Thus, there seems to be a risk that hospitalization rates for asthma have been underestimated in the study of Säynätkangas et al. (1).

We compared asthma hospitalizations in children from two areas with different asthma treatment policies, Oulu area in North Finland and Kuopio area in East Finland, from 1995 to 1999 (3). The patients treated for asthma or wheezing in hospital were identified from the medical cards of the hospitals. All medical cards were checked, and the presence of asthma was confirmed by identical criteria: two or more expiratory obstructions leading to emergency treatment, irrespective of the discharge diagnoses. In children over 2 years of age, inhaled steroids were actively used as the primary maintenance therapy for asthma in Oulu area, whereas a stepwise policy—primarily cromones, and inhaled steroids in the cases not controllable by cromones—was used in Kuopio area. The data on the use of inhaled steroids and cromones in the two areas were obtained from the purchase-based, prescription drug dispensing register of Social Insurance Institution of Finland.

In children aged 6–15 years, the average total hospitalization rate for asthma was significantly higher (1.2/1000) in Kuopio area than in Oulu area (0.3/1000) with active use of inhaled steroids; however, no evident decrease was observed during the study period from 1995 to 1999. Likewise, the respective rates of re-admissions, 0.2 per 1000 and 0.02 per 1000, differed significantly between the child populations of the two areas (3).

In children aged 2–5 years, likewise, the average total hospitalization rates were significantly higher in Kuopio area (5.1/1000) than in Oulu area (2.0/1000), again with no evident decrease from 1995 to 1999 (3). The difference between re-admissions, 0.8 per 1000 in Kuopio area and 0.4 per 1000 in Oulu area, did not reach statistical significance.

In children under 2 years of age, cromones were not used, and now steroids were used more actively in Kuopio area than in Oulu area. As seen in Table 1, both total admission rates and re-admission rates were, in contrast to older age groups (3), lower in Kuopio area than they were in Oulu area.

Our figures are not directly comparable with those of Säynätkangas et al. (1), because they did not present age-specific data. The hospitalization rates for asthma, and likewise the effectiveness of treatment modalities at the population level, are highly dependent on age.

In conclusion, hospital admissions for paediatric asthma, and re-admissions in particular, can be diminished with the active use of inhaled steroids in the child population (1,3–5). An early asthma diagnosis and active use of inhaled steroids was also the idea of the national asthma programme (2). Currently, the start and duration of asthma treatment in children under school age are advised to be based on asthma risk factors and documented disorders in lung function, and intermittent treatment with inhaled steroids or leukotriene antagonists are preferred (6). This treatment policy saves

 

money and decreases the risk of harmful effects of steroids. However, the selection of the proper patients into the proper therapeutic groups (bronchodilators on demand, inhaled steroids or leukotriene antagonists intermittently, or inhaled steroids and/or leukotriene antagonists continuously) is a challenge. There is a risk of undertreatment presenting in insufficient asthma control and in less beneficial hospitalization trends in future.

## References


1. Säynätkangas O, Valmari P, Tuuponen T, Keistinen T. Trends in hospitalization for childhood asthma in Finland in 1996–2004. *Acta Paediatr* 2007; 96: 919–23.
2. Haahtela T, Laitinen LA. Asthma programme in Finland 1994–2004. Report of working group. *Clin Exp Allergy* 1996; 26 Suppl 1: 1–24.
3. Korhonen K, Dunder T, Klaukka T, Reijonen TM, Issakoff K, Kiviharju M, et al Do inhaled steroids differ from cromones in terms of hospital admission rates for asthma in children? *Acta Paediatr* 2004; 93: 1612–8.
4. Wennergen G, Kristjansson S, Strannegard IL. Decrease in hospitalization for childhood asthma with increased use of anti-inflammatory treatment, despite an increase in prevalence of asthma. *J Allergy Clin Immunol* 1996; 97: 742–8.
5. Bisgaard H, Moller H. Changes in risk of hospital re-admission among asthmatic children in Denmark, 1987–1991. *Brit Med J* 1999; 319: 229–30.
6. Pelkonen A, Malmberg P, Remes S, Mäkelä M. Asthma in the young child: diagnosis and treatment (Finnish). *Suom Lääkärilehti* 2006; 61: 3713–8.