

Acute non-traumatic hip pathology in children: incidence and presentation in family practice

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Background. The differential diagnosis of children with acute non-traumatic hip pathology varies from quite harmless conditions such as transient synovitis of the hip to more severe problems like Perthes' disease, slipped capital femoral epiphysis (SCFE) and life-threatening conditions such as septic arthritis of the hip.

Objective. To provide population-based data on symptom presentation and incidence rates of non-traumatic acute hip pathology in family practice.

Methods. We analysed data from a large national survey of family practice (104 practices), which was carried out by the Netherlands Institute for Health Services Research (NIVEL) in 2001. We included all children aged 0–14 years. Incidence rates were calculated by dividing the total number of cases (numerator) by the average study population at risk (denominator).

Results. Our study population consisted of 73 954 children aged 0–14 years, yielding 68 202 person-years. These children presented with 101 episodes of acute non-traumatic hip pathology. The presenting feature in 81.5% of the children was pain, in 8.6% limping and 9.9% presented with both symptoms. Only 27% of the participating family practitioners (FPs) reported whether the child had a fever. The incidence rate for all acute non-traumatic hip pathology was 148.1 per 100 000 person-years, and for transient synovitis, this was 76.2 per 100 000 person-years.

Conclusion. In family practice, most children with acute non-traumatic hip pathology present with pain as the initial symptom. FPs need to be more aware that fever is the main distinguishing factor between a harmless condition and a life-threatening condition. Transient synovitis is the diagnosis with the highest incidence rate.

Keywords. Children, family practice, hip pathology, incidence, transient synovitis.

Introduction

Children with acute non-traumatic hip pathology present in different ways, e.g. with a limp or abnormal gait, with pain, refusal to bear weight or decreased movement of the involved leg. These complaints represent a diagnostic problem for the family practitioner (FP), not only because of the wide range of these complaints but also because the differential diagnosis varies from quite harmless conditions such as transient synovitis of the hip to more severe problems like Perthes' disease, slipped capital femoral epiphysis (SCFE) and life-threatening conditions such as septic arthritis of the hip (Box 1). A few studies have aimed to establish

which (preferably minimally invasive) parameters are most relevant in clinical decision-making for acute non-traumatic hip pathology, in order to make the correct diagnosis in a clinical setting.^{1–3} It is unclear whether the existing literature is useful for FPs because most available studies were performed in hospitals and concentrate on specific diagnoses. However, children do not present to the FP with a diagnosis but with a symptom (e.g. pain or limping), and the FP must make the right assessment and apply appropriate management. It is of value to know which complaints children with acute non-traumatic hip pathology present to the FP and how often the different diagnoses are made in family practice. This helps to determinate

Box 1 *Definitions of the most relevant conditions in the differential diagnosis of acute non-traumatic hip pathology*

Transient synovitis of the hip	An acute self-limiting (3–10 days) benign inflammation of the synovial lining of the hip
Perthes' disease	Necrosis or degeneration of the ossification centre of the femoral head epiphysis and subsequent spontaneous regeneration and re-calcification
SCFE	A posterior slipping of the femoral head in relation to its metaphysis, resulting in a shearing failure of the growth plate
Septic arthritis of the hip	Infection of the hip, which can result in damage to the articular cartilage, osteonecrosis of the proximal part of the femur, femoral osteomyelitis and sepsis

the prior chance for the different diagnoses when a child contacts you with hip-related symptoms.

In order to provide population-based epidemiological background data and facilitate appropriate assessment in the child with acute non-traumatic hip pathology in family practice, we used data from a national survey performed in Dutch family practice (2001), and aimed to answer the following questions:

- What is the distribution of symptoms presented to the Dutch FP in children with acute non-traumatic hip pathology?
- What is the incidence and distribution of the separate diagnoses in acute non-traumatic hip pathology among children in Dutch family practice?

Methods

We analysed data from the second Dutch national survey of family practice (NS2), which was carried out by the Netherlands Institute for Health Services Research (NIVEL) in 2001. In the Netherlands, family practices have a fixed list size, and all non-institutionalized inhabitants are listed in a family practice. The FP is the first health care professional to be consulted and acts as gatekeeper to secondary care.

The survey represented the 1.5 million contacts between 385 461 patients (i.e. all listed patients) and their general practice during a 12-month period. We were able to use the medical record data on these contacts, and in addition, around 77% of patients had taken part in a census in order to provide up-to-date demographic data (for further details, see Westert *et al.*⁴). For the current paper, a subsample of 73 954 children aged 0–14 years was analysed.

The FPs registered all health problems presented within a consultation, and coded the diagnosis

using the International Classification of Primary Care (ICPC). Contact diagnoses related to the same health problem were clustered into disease episodes. Nine practices were excluded from the analyses because of insufficient data quality.

The FPs in NS2 did not use ICPC subcoding; therefore, to retrieve all consultations for possible acute non-traumatic hip pathology, the first and second authors (MK and JCvdW) selected all possibly related ICPC codes of the children aged 0–14 years (ICPC codes: L02, L13, L14, L15, L20, L28, L29, L70, L88, L98 and L99; for further details, see Appendix 1). Then, we screened the free text of the consultations with these diagnostic codes for seven Dutch keywords (English equivalents are: transient, synovitis, Perthes, epiphysis, pain, limp and hip). The cases thus retrieved were compared by MK and JCvdW and discussed in order to reach consensus. The retrieved records were checked for more specific details and diagnoses. Included for analysis were all cases in which one of our four diagnoses of primary interest was made (see Box 1) and cases in which in the history part of the journal was spoken of a child with an acute limp due to the hip or acute pain in the hip. Excluded were those cases in which the FP mentioned a trauma or cases with diagnoses like congenital malformations or malignancies (diagnoses that does not fall in the spectrum of acute non-traumatic hip pathology).

Statistical analysis

The incidence rate was calculated by dividing the total number of newly diagnosed cases (numerator) by the average study population at risk, the so-called mid-time population (denominator). The mid-time population was calculated as the mean of all listed patients (aged 0–14 years) of all FPs at the beginning and at the end of the registration period. We chose to use incidence rates for the following reasons: the conditions under investigation are rare; medical records are dynamic; people are in the database for different periods of time and other articles also report incidence rates; therefore, this makes our work comparable with other studies. Incidence rates were expressed per 100 000 person-years (this means that for example if the incidence rate would be 25 than in every 100 000 children that are in the family practice for a complete year, the FP will see 25 cases). The 95% confidence intervals (CI) were calculated assuming a Poisson distribution using STATA version 8.2. The statistical package SPSS 15.0 was used for all other analyses. Data were stratified for gender.

Results

Study population

Our study population consisted of 73 954 children aged 0–14 years, yielding 68 202 person-years. These

children had 157 contacts with the FP concerning acute non-traumatic hip pathology (hereafter referred to as 'hip pathology'), which contributed to 101 episodes; 75 children visited their FP on one single occasion, 29 children returned once and 7 children paid three or more visits concerning the same episode of hip pathology.

Symptoms

The distribution of symptoms among the different diagnoses is shown in Table 1. In 81.5% of the children, pain was the presenting feature, limping was the initial symptom in 8.6% of the children and 9.9% of the children presented with both symptoms. If pain was the presenting feature, 69.0% of the children localized it in the hip, 9.9% in the groin, 5.6% in the knee and 15.5% in the leg.

In 27.0% of the episodes of hip pathology, the FP recorded whether the child had a fever. In the episodes where transient synovitis was the final diagnosis, the presence or absence of fever was recorded in 34.6% of the episodes. In the present study, 11.5% of the cases with transient synovitis presented with a fever; in Perthes' disease and SCFE, this was recorded in one out of six cases and in one out of four cases, respectively.

Diagnosis

Table 2 shows the distribution of incidence rates of the different diagnoses stratified by gender. The incidence rate of acute hip pathology was 148.1 (95% CI 120.6–179.9) per 100 000 person-years. Transient synovitis had the highest incidence rate 76.2 (95% CI 56.9–100.0) per 100 000 person-years.

TABLE 1 Distribution of presenting symptoms among the different diagnoses of acute non-traumatic hip pathology in children aged 0–14 years in Dutch family practice

Diagnosis	Transient synovitis, N = 38 ^a	Perthes' disease, N = 6	SCFE, N = 3 ^b	Total hip pathology, N = 81 ^c
Symptom				
Pain (%)	72.2	100	100	81.5
Limp (%)	16.7	0	0	8.6
Pain + limp (%)	11.1	0	0	9.9
Location of pain ^d				
Hip (%)	56.7	66.7	66.7	69.0
Groin (%)	5.3	16.7	33.3	9.9
Knee (%)	10.5	0	0	5.6
Leg (%)	18.4	16.7	0	15.5

^aFor 14 patients diagnosed with transient synovitis, it was not possible to retrieve the initial symptom.

^bFor one patient diagnosed with SCFE, it was not possible to retrieve the initial symptom.

^cIn 20 of the total patients with acute non-traumatic hip pathology, it was not possible to retrieve the initial symptom.

^dIn the patients which presented with pain as the initial symptom.

Figure 1 shows the age distribution for total hip pathology and for transient synovitis (the diagnosis with the highest incidence). The mean age for total hip pathology was 5.9 years: for girls 6.1 years and for boys 5.7 years. The mean age for transient synovitis was 4.7 years, for girls 4.1 years and for boys 5.1 years. We found six cases of Perthes' disease with a median age of 10 years and four cases of SCFE with a median age of 9.5 years.

Discussion

Summary of main findings and comparison with existing literature

The 101 children in our study presenting with hip pathology had 147 contacts with the FP; 52 cases were diagnosed with transient synovitis, six with Perthes' disease and four with SCFE. In the remaining, a symptom diagnosis was available only for 39 cases. No case of septic arthritis was diagnosed among the children in our study.

Most children presented with pain as the primary symptom. In their study, Fischer and Beattie⁵ found that 79.4% of the children with an acute non-traumatic limp in the emergency department presented primarily with pain; this is comparable to the 81.5% that we found. While 100% of the patients diagnosed with Perthes' disease and with SCFE primarily presented with pain, only 77.2% of the patients diagnosed with transient synovitis did. Referred pain in the knee might be associated with transient synovitis: 10.5% of the patients in our study with transient synovitis localized this pain in the knee, while none of the patients with Perthes' disease and SCFE did so (Fisher's exact test $P = 0.574$). Fischer and Beattie⁵ reported comparable results: 8.3% of their irritable hip/transient synovitis patients localized the pain in the knee compared with none of the patients with Perthes' disease or SCFE.

While fever is one of the most important (non-invasive) distinguishing factors between transient synovitis and septic arthritis (Box 2),^{2,6} in our study, its presence was recorded in only 27% of the episodes of hip pathology. It was not possible to assess retrospectively why the occurrence of fever was not recorded more often. In our study, 11.5% of the cases with transient synovitis presented with fever. Eich *et al.*¹ found a comparable percentage of 14.0%; in addition, of their 87 patients with acute non-traumatic hip pathology, eight had septic arthritis, and of these latter patients a substantially higher number (7, i.e. 87.5%) presented with a fever. Kocher *et al.*⁶ reported fever in 8.1% of their patients with transient synovitis and in 81.7% of their patients with septic arthritis.

Unfortunately, no occurrence rates are available on total acute non-traumatic hip pathology seen in family

TABLE 2 Incidence rates/100 000 person-years in children aged 0–14 years of acute hip pathology in Dutch family practice, by diagnosis and gender

	Incidence rate total	95% CI interval	Incidence rate males	95% CI interval	Incidence rate females	95% CI interval
Transient synovitis (<i>n</i> = 52)	76.2	56.9–100.0	91.1	62.3–128.6	60.5	36.9–93.4
Perthes' disease (<i>n</i> = 6)	8.8	3.2–19.1	5.7	0.7–20.6	12.1	3.3–31.0
SCFE (<i>n</i> = 4)	5.9	1.6–15.0	2.9	0.1–15.9	9.1	1.9–26.5
Symptom diagnosis (<i>n</i> = 39)	57.2	40.7–78.2	62.6	39.3–94.8	51.5	30.0–82.4
Total (<i>n</i> = 101)	148.1	120.6–179.9	162.3	122.9–210.2	133.2	96.8–178.8

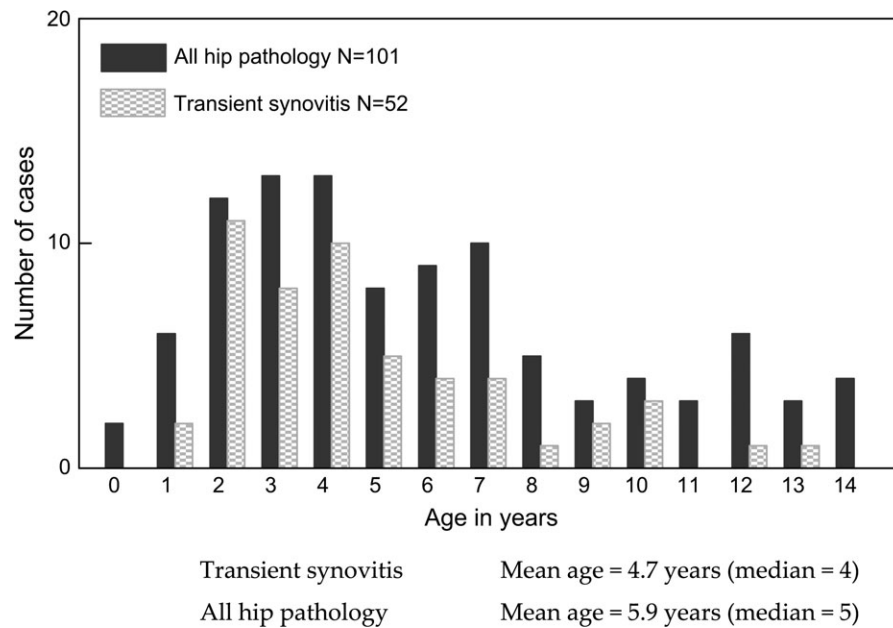


FIGURE 1 Age distribution of all acute non-traumatic hip pathology and transient synovitis of the hip seen by Dutch FPs in children aged 0–14 years

Box 2 Differentiation between transient synovitis and septic arthritis. Predictors of septic arthritis identified by Kocher *et al.*^{2,6}

- (1) Fever
- (2) Inability to bear weight
- (3) ESR > 44 mm/hour
- (4) WBC > $12 \times 10^9/l$

practice with which to compare our incidence rate. In the present study, transient synovitis is the diagnosis with the highest incidence rate, i.e. 76.2 (95% CI 56.9–100.0) per 100 000 person-years. In a previous study, in Dutch family practice in 1987 with a similar design, an incidence rate of 110 per 100 000 person-years was reported in children aged 0–14 years.⁷ Other occurrence rates range from 51.9 per 100 000 children under 16 years of age in Finland⁸ to 130 per 100 000 in Germany in children aged 0–16 years⁹ to 200 per 100 000 in Sweden in children aged 0–14 years.¹⁰ Considerable variability has been reported in the incidence of Perthes' disease in different populations. In

our study, we calculated the incidence rate of Perthes' disease to be 8.8 per 100 000 person-years; this is comparable to the incidence found in Norway in children aged 0–14 years of 9.0 per 100 000 person-years.¹¹ Others have reported a low incidence in Asian countries, e.g. the annual incidence in Japan was calculated to be 0.9 per 100 000 person-years.¹² Highest incidence rates were reported in inner city Liverpool: 21.1 per 100 000 person-years.¹³

In our study, the incidence rate of SCFE was 5.9 (95% CI 1.6–15.0) per 100 000 person-years. Lehmann *et al.*¹⁴ found an annual incidence of 10.8 per 100 000 in the USA in children aged 9–16 years. Kelsey *et al.*¹⁵ found occurrence rates ranging from 2.13 per 100 000 in New Mexico to 10.1 per 100 000 in Connecticut, USA.

Strengths and limitations of this study

This large and representative survey enabled us to assess the occurrence of hip pathology in primary care. Due to the rarity of the disorders, a large sample size is needed and therefore an FP database was a suitable

instrument to work with regarding our research questions. Dutch family practice is a potentially valid source because all non-institutionalized inhabitants are registered with an FP, and the FP fulfils the role as 'gatekeeper'. The lack of accuracy of the diagnosis, and the under-representation of cases presented at out-of-hour services, might be considered a potential limitation in these FP databases.^{16,17} In our analysis, we assumed that the diagnosis and registration by the FPs was correct and accurate. All participating FPs were trained in the correct coding of the ICPC and were explicitly asked to register the out-of-hour episodes.⁴ Despite the large size of this survey, we found few children with Perthes' disease and SCFE, and none with septic arthritis; therefore, it was not possible to accurately assess the age and gender distributions for the first two conditions or calculate an incidence rate for the latter.

Conclusion

The present study enabled us to assess incidence rates and occurrence of symptoms of acute non-traumatic hip pathology in children in family practice. This provides important epidemiological background data. There seems to be an association between referred pain to the knee and transient synovitis; this might be a useful diagnostic tool and further research is needed to confirm this. This study shows that while fever is one of the most important non-invasive distinguishing factors between transient synovitis and septic arthritis^{2,6} (Box 2), its presence was recorded in only about 25% of hip pathology. FPs need to be more aware that fever is the main distinguishing factor between a harmless condition and a life-threatening condition.

Ethical approval

The study was carried out according to Dutch legislation on privacy. The Dutch Data Protection Authority approved the privacy regulation of the study. According to Dutch legislation, obtaining informed consent is not obligatory for observational studies.

Declaration

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Conflict of interest: None.

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Appendix 1

L02 = back symptom/complaint
 L13 = hip symptom/complaint
 L14 = leg/thigh symptom/complaint
 L15 = knee symptom/complaint
 L20 = joint symptom/complaint NOS
 L28 = limited function disability
 L29 = symptoms/complaints musculoskeletal other
 L70 = infections musculoskeletal system
 L88 = rheumatoid/sero-positive arthritis
 L98 = acquired deformity of limb
 L99 = musculoskeletal disease other