Perthes disease: a survey of management amongst members of the British Society for Children's Orthopaedic Surgery (BSCOS)

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Abstract The treatment of Legg-Calvé-Perthes disease remains controversial. The aim of this survey was to ascertain the current management strategies of this condition amongst UK paediatric orthopaedic surgeons, with particular regard to containment procedures in the fragmentation phase. Questionnaires were distributed at the January 2006 meeting of the British Society for Children's Orthopaedic Surgery (BSCOS) and was posted to all absent members. The results showed a great deal of variability not only in the treatment of Perthes disease, but also in the decision-making processes. Consideration must now be given to a carefully constructed national multi-centre prospective randomised controlled study into the optimum management of this disease

Keywords Perthes disease · Containment · Arthrogram · Osteotomies · Lateral subluxation

Introduction

Legg-Calvé-Perthes disease is a childhood hip disorder occurring most commonly in the age range of 4–8 years [1]. It was first described in 1910 by Legg, Calvé, Perthes and Waldenstrom, and is characterised by transient avascularity of the femoral head. Eventually, the head revascularises, dead bone is replaced and remodelling occurs.

The outcome in terms of the resultant shape of the femoral head is difficult to predict, as it varies from patient to patient and depends partly on age at presentation, the proportion of the head involved and the severity of the disease. It is, therefore, difficult to formulate individual patient treatments. Also, most studies of current treatment methods lack interrater and intrarater reliability of classifications of the extent of epiphyseal involvement and outcome measures, and all lack control groups. These factors make it difficult to support a “best” method of treatment.

The primary goals in the treatment of Legg-Calvé-Perthes syndrome are to prevent deformity, growth disturbance and resultant degenerative joint disease. During the early years, Legg, Calvé and Waldenstrom concluded that surgical treatment had little effect on outcome. Treatment methods were based on those used to treat tuberculosis of the hip, which included spica cast immobilisation, bed-rest, traction and weight-relieving caliper. The cornerstone of treatment for Legg-Calvé-Perthes syndrome is referred to as “containment.” This concept was originally described by Harrison and Menon [2] and Eyre-Brook [3].

The essence of containment is that, to prevent deformity of the diseased epiphysis, the femoral head must be contained within the depths of the acetabulum in order to equalise the pressure on the head and subject it to the moulding action of the acetabulum [4]. This may be achieved by operative or non-operative methods. Arthrography may be a useful adjunct in determining whether the head actually can be contained and, if so, in what position this is best accomplished [1, 5]. Rab [6], however, questioned the containment concept, and believes that femoral head reorientation (osteotomy) may improve femoral head stability when necrosis is limited, but is unlikely to reduce subluxation or collapse when extensive necrosis is present.

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Some authors have reported satisfactory results with non-operative treatment, such as bracing and cast immobilisation [7, 8], but others disagree, stating that it is no better than no treatment at all [9].

Many investigators have reported good results with femoral varus osteotomies [10–12]. Others have recommended the Salter innominate osteotomy as an effective treatment alternative [10, 13, 14, 15]. Still, some follow more complex surgical interventions [16, 17, 18, 19].

However, some authors have shown no change in clinical results following femoral varus osteotomies or innominate osteotomies [20] and others found that the outcome was similar in both operative and non-operative management [12]. There is no clear universally accepted treatment strategy for Perthes disease, as evident from the above available studies.

Materials and methods

Questionnaires were designed with the help of the English South West Paediatric Orthopaedic group and a statistician (see Appendix). These were distributed at the January 2006 meeting of the British Society for Children's Orthopaedic Surgery (BSCOS) and was posted to all absent members.

There are 179 BSCOS members. Forty questionnaires were collected at the meeting and 48 questionnaires were returned by post, giving a 49% return. Eleven had retired and chose not to participate. This left 77 questionnaires for analysis.

Results

There was a wide variation in opinion about the management of Perthes disease. Regarding conservative management,

Fig. 1 Number of osteotomies performed each year

Table 1 The most commonly performed operations

Varus femoral osteotomy	Shelf acetabuloplasty	Salter's osteotomy	Pemberton/Dega acetabuloplasty	Valgus femoral osteotomy
51%	26%	18%	3%	1%

26% used abduction braces on occasion, while petri casts were used by 43% of members and the majority advised physiotherapy (90%).

Of the 77 members, three never performed surgery for early Perthes disease. Of the remaining 74 members who did perform surgery, nine (11%) felt that arthrogram was

Fig. 2 a Hinge abduction. b Concentric incongruity. c Congruent sphericity in abduction

not required and, therefore, did not perform one prior to surgical procedure.

The need for an arthrogram was determined by several factors, which came under three headings in the questionnaire: history, examination and radiological features. Severity of symptoms, age, duration of symptoms and gender were considered to be factors on occasion by all surgeons, while on clinical examination, loss of abduction in extension was always considered to be a determining factor for the need for arthrogram by all of those who perform arthrograms. The other clinical indications were loss of hip flexion, loss of internal rotation in flexion, loss of adduction in flexion and limp, in descending order of importance. Obesity was considered as a very minimal deterrent for the need for arthrogram.

The radiographic signs were lateral subluxation, involvement of proximal head, lateral pillar height, calcification lateral to the epiphysis, metaphyseal reaction, horizontal growth plate, degree of fragmentation and subchondral fracture, in decreasing order of importance.

Forty-two surgeons (56%) performed 1–5 osteotomies per year, 15 surgeons (28%) performed 6–10 osteotomies and three (4%) performed more than 10 osteotomies per year (Fig. 1).

Fifty-one percent (51%) of surgeons intimated that varus femoral osteotomies are their most commonly performed operation. For shelf acetabuloplasty, Salter's osteotomy, Pemberton/Dega and valgus osteotomies, the figures were 26%, 18%, 3% and 1%, respectively (Table 1).

Contraindications to containment surgery were as follows: preoperative loss of abduction in extension ($<30^\circ$) was an absolute contraindication for 24% of surgeons, 38% believed it would be contraindicated in more than half of all cases and 24% in less than half of all cases. Fourteen percent (14%) of surgeons considered the age of the patient to be a factor. Hinge abduction (Fig. 2a) was considered to be an absolute contraindication to containment surgery for

49% of those performing surgery, 8% never considered it a contraindication, while 11% sometimes considered it as a contraindication. Concentric incongruity (Fig. 2b) in abduction was considered as a contraindication to surgery by 12%, 16% believed it never to be a contraindication and 39% sometimes felt it to be a contraindication to containment surgery. One stated that this is the indication for containment. Thirty-one percent (31%) of surgeons followed a Herring philosophy, taking patients' age and height of the lateral pillar into consideration. Three percent (3%) used a Caterall management strategy in addition. Others used some but not all of the "head at risk" signs to decide on intervention.

Discussion

As evident from the above survey, there is a wide variation of opinion regarding the management of Perthes disease amongst the paediatric orthopaedic surgeons of Britain. This reflects the confusion which exists in the literature on the subject. There is only one prospective multi-centre study on the effect of treatment on outcome in the literature [9]. Herring et al. [9] concluded in his prospective multi-centre study that the lateral pillar classification and the age at the time of onset of the disease strongly correlate with the outcome in patients with Legg-Calvé-Perthes disease. He showed that patients over the age of 8 years at the time of onset and with lateral pillar B group or B/C border group have a better outcome with surgical treatment than they do with non-operative treatment [9]. No such study has been carried out in the UK.

Consideration must now be given to a carefully constructed national multi-centre prospective randomised controlled study into the optimum management of this disease.

Appendix

SURVEY OF MANAGEMENT OF PERTHES' AMONGST MEMBERS OF BSCOS

NAME:

Please indicate your answers where appropriate by placing an "X" on the point of scale on the right-hand side of the page
e.g.

DO I FILL IN QUESTIONNAIRES FOR A CHANCE TO WIN QUALITY CHAMPAGNE AT BSCOS?

Never X Always
Sometimes

- A** 1) DO YOU PERFORM EARLY SURGERY FOR CHILDREN WITH PERTHES? (before onset of healing phase)
Of those children deemed to require surgery, which of the following do you most frequently perform?

2) VARUS FEMORAL OSTEOTOMY

3) SALTER'S OSTEOTOMY

4) PEMBERTON / DEGA INNOMINATE OSTEOTOMY

5) SHELF ACETABULOPLASTY

6) VALGUS OSTEOTOMY BEFORE THE HEALING PHASE

- B** DO YOU BELIEVE ANY PARTICULAR SURGICAL TREATMENT HOLDS MERIT OVER THE OTHERS?

7) IF SO WHICH OF THE ABOVE?

1 2 3 4 5 6

8) PLEASE ESTIMATE THE NUMBER OF OSTEOTOMIES YOU PERFORM EACH YEAR FOR PERTHES = ...

- C** HOW OFTEN DO YOU USE ANY OF THE CONSERVATIVE TREATMENTS BELOW?

9) ABDUCTION BRACE

10) PETRIE (ABDUCTION) CASTING

11) HOME PHYSIOTHERAPY EXERCISES (INCL SWIMMING)

12) FORMAL OUTPATIENT PHYSIOTHERAPY

13) INPATIENT PHYSIOTHERAPY

Never Always
Sometimes

- D** WHICH OF THE FOLLOWING CRITERIA DO YOU ROUTINELY EMPLOY TO DETERMINE THE NEED FOR ARTHROGRAM?

History:

Never Always
Sometimes

14) AGE 15) GENDER 16) DURATION OF SYMPTOMS 17) SEVERITY OF SYMPTOMS 18) Other.....	3
	Never Sometimes Always
Examination: 19) OBESITY 20) LIMP 21) LOSS OF ADDUCTION IN FLEXION 22) LOSS OF INTERNAL ROTATION IN FLEXION 23) LOSS OF ABDUCTION IN EXTENSION 24) LOSS OF FLEXION / INCREASED FIXED FLEXION	

E WHICH OF THE FOLLOWING **PLAIN RADIOGRAPHIC SIGNS** DO YOU ROUTINELY EMPLOY **TO DETERMINE THE NEED FOR ARTHROGRAM?**

25) DEGREE OF EPIPHYSEAL FRAGMENTATION 26) HEIGHT OF LATERAL EPIPHYSEAL PILLAR 27) PROPORTION OF HEAD INVOLVED 28) LATERAL EPIPHYSEAL CALCIFICATION 29) GAGE'S SIGNS 30) DIFFUSE METAPHYSEAL REACTION 31) FEMORAL HEAD LATERAL SUBLUXATION 32) HORIZONTAL GROWTH PLATE 33) SUBCHONDRAL FRACTURE LINE	Never Sometimes Always

F SURGERY

IN YOUR PRACTICE, WHICH OF THE FOLLOWING **CLINICAL** FEATURES WILL **PRECLUDE SURGERY** (VARUS FEMORAL OSTEOTOMY or SALTER'S OSTEOTOMY)

34) PREOPERATIVE LOSS OF ABDUCTION IN EXTENSION <30° 35) CHRONOLOGICAL AGE (SPECIFY..... ...)	Never Sometimes Always

36) BONE AGE
(SPECIFY.....)

37) OTHER .....

IN YOUR PRACTICE WHICH OF THE FOLLOWING
**ARTHROGRAPHIC FINDINGS WILL ROUTINELY PRECLUDE
SURGERY**
(VARUS OSTEOTOMY or SALTER'S OSTEOTOMY)

38) HINGE ABDUCTION

39) CONCENTRIC
INCONGRUENCY IN
ABDUCTION

40) CONGRUENT SPHERICITY
IN ABDUCTION

41) OTHER .....

.....

4

Never Sometimes Always

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