Usage of intra-articular corticosteroid injections for the treatment of juvenile idiopathic arthritis: a survey of pediatric rheumatologists in the United States and Canada

T. Beukelman[1], J.P. Guevara[2, 3], D.A. Albert[4], D.D. Sherry[5], J.M. Burnham[3, 5]

[1]Department of Pediatrics, Division of Rheumatology, University of Alabama at Birmingham, USA; [2]Department of Pediatrics, Division of General Pediatrics, The Children's Hospital of Philadelphia, Pennsylvania, USA; [3]The Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania School of Medicine, Pennsylvania, USA; [4]Division of Rheumatology, Department of Medicine, Dartmouth-Hitchcock Medical Center, Lebanon, NH, USA; [5]Department of Pediatrics, Division of Rheumatology, The Children's Hospital of Philadelphia, Pennsylvania, USA.

Abstract

Objective

To characterize the current usage of intra-articular corticosteroid injections (IACI) by pediatric rheumatologists and the perceived disadvantages of and obstacles to IACI therapy.

Methods

We mailed a 32-item questionnaire to pediatric rheumatologists in the United States and Canada (n=201) to assess treatment strategies for the initial treatment of monoarthritis of the knee in juvenile idiopathic arthritis (JIA). Information regarding the usage of IACI for all patients with JIA and physicians' perceptions of IACI therapy was obtained. Respondents were dichotomized into those who performed frequent pediatric IACI (greater than 50 IACI in the last 12 months) and those who did not.

Results

One hundred and twenty-nine (64%) completed questionnaires were returned. IACI were recommended as one therapy for JIA by 99% of respondents, and 90% personally perform IACI. Frequent IACI were performed by 22%, and 15% had performed greater than 10 IACI in a single pediatric patient at one time. Those who did not perform frequent IACI were more likely to report concern about the pain of the procedure, the availability of nursing support, and their own comfort with performing the procedure; they were less likely to have performed greater than 20 pediatric IACI during fellowship training and evaluated fewer clinic patients per week.

Conclusion

IACI are essentially universally recommended in the treatment regimen for JIA. However, there are differences in the usage of IACI among pediatric rheumatologists. The frequency of IACI use is associated with different perceptions of and training received in IACI therapy.

Key words

Juvenile idiopathic arthritis, intra-articular injections, therapy, survey.

Timothy Beukelman, MD, Assistant Professor of Pediatrics; James P. Guevara, MD, MPH, Assistant Professor of Pediatrics; Daniel A. Albert, MD, Professor of Medicine and Pediatrics and Chief of Division of Rheumatology; David D. Sherry, MD, Professor of Pediatrics; Jon M. Burnham, MD, MSCE, Assistant Professor of Pediatrics.

Please address correspondence and reprints requests to: Timothy Beukelman, University of Alabama at Birmingham, FOT 838, 1530 3rd Avenue South, Birmingham, AL 35294, USA.
E-mail: tbeukelman@peds.uab.edu

Received on October 4, 2007; accepted in revised form on March 21, 2008.

Conflict of interest: Dr. T. Beukelman was supported by gifts from Amgen, Berlex, Merck, Novartis, Pfizer, and Wyeth to the pharmacoepidemiology training program of the Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania School of Medicine; Dr. J.M. Burnham was supported by NIH grant number 1K23RR02196902. The small financial reimbursement to subjects was paid for by an unrestricted educational gift from Pfizer. The other co-authors have declared no competing interests.

Introduction

Intra-articular corticosteroid injections (IACI) are a proven, effective therapy in juvenile idiopathic arthritis (JIA) (1, 2). Although IACI are among the more commonly used therapies for JIA (3, 4), few details of the usage of IACI by pediatric rheumatologists in clinical practice have been reported.

Using a physician questionnaire survey regarding the initial treatment of knee monoarthritis in JIA, we found that 90% of respondents recommended IACI as either initial therapy or after 6 months or less of unsuccessful therapy with non-steroidal anti-inflammatory drugs (5). In this report, we characterize the current usage of IACI by pediatric rheumatologists in the general treatment of JIA, including the number of IACI performed in the preceding 12 months and the specific joints for which IACI are recommended. We describe the perceived disadvantages of and obstacles to IACI therapy and their associations with IACI usage.

Materials and methods

Subjects were identified from a 2006 list of physician Fellow Members of the Section of Pediatric Rheumatology of the American College of Rheumatology in the United States (n=187) and Canada (n=14). Subjects were mailed a self-administered questionnaire containing 32 free response and multiple-choice items. Details of the questionnaire have been previously published (5).

Statistical analysis was performed using Stata 9.0 (StataCorp, College Station, TX, USA). For comparison, respondents were considered to have performed frequent IACI if they had performed or supervised greater than 50 pediatric IACI (the highest of the multiple-choice options) in the preceding 12 months. Frequencies were compared using the chi-square and Fisher's exact tests, where appropriate. Continuous variables were compared using the Wilcoxon rank-sum test. Potential confounding was evaluated using multivariable logistic regression models.

Results

One hundred and twenty-nine (64%) completed questionnaires were returned. The demographic characteristics of the respondents have been previously described (5). In general, the respondents were experienced pediatric rheumatologists; 75% had pediatric rheumatology fellowship training, 83% were board certified in pediatric rheumatology, 81% were in practice for more than 10 years, and 93% evaluated 5 or more pediatric rheumatology clinic patients per week.

IACI were essentially universally recommended as one therapy for JIA; 123 of 124 (99%) respondents would personally perform IACI or refer their patient to another physician, such as an orthopedist or interventional radiologist, for IACI therapy. Twelve of 128 (9%) respondents do not personally perform any IACI, and 5 of 124 (4%) do not refer any patients for IACI.

The number of individual pediatric IACI performed or directly supervised in the preceding 12 months by respondents who evaluated 5 or more pediatric rheumatology clinic patients per week are summarized in Table I. One hundred out of 115 (87%) respondents performed or supervised at least 1 IACI in the last year. By our definition, 25 (22%) performed frequent IACI.

Table II shows the percentages of respondents who personally perform IACI or refer to another physician according to the joint involved. The overall median number of different joints personally injected was 5. Most respondents personally perform IACI of the knee, ankle, and wrist joint. Fewer than 5% of respondents personally per-

Table I. Number of individual pediatric IACI personally performed or directly supervised in the preceding 12 months among respondents who evaluate 5 or more pediatric rheumatology clinic patients per week (n=115).

No. of IACI performed or supervised	No. of respondents
Zero	15 (13%)
1 – 5	14 (12%)
6 – 10	13 (11%)
11 – 20	22 (19%)
21 – 50	26 (23%)
> 50	25 (22%)

IACI: intra-articular corticosteroid injection.

form IACI of the temporomandibular, sacroiliac, and hip joint.

We evaluated whether pediatric rheumatologists had performed multiple IACI at one time in a single patient with JIA, a practice that has been described (6, 7), but not well studied. Seventy-three of 126 (58%) respondents had performed at least 3 IACI concurrently in a single pediatric patient, and 19 (15%) had performed greater than 10 IACI concurrently. Those who had performed greater than 10 IACI concurrently appeared to have been in practice for a shorter duration of time compared to those who had not (median 13 *vs*. 18 years in practice, p=0.07).

The training in IACI received by respondents during fellowship was variable. Among those who completed fellowship training in pediatric rheumatology, 31 out of 93 (41%) performed greater than 20 pediatric IACI during fellowship. Training in IACI appears to have increased over time. Of those who completed fellowship in the last 10 years, 16 out of 23 (70%) performed greater than 20 pediatric IACI during training. By comparison, 22 out of 70 (31%) of those who completed fellowship more than 10 years ago performed greater than 20 pediatric IACI during training (p=0.001). Training in pediatric IACI was associated with performing frequent IACI in the last year. Of those who performed frequent IACI, 16 of 25 (64%) performed great than 20 pediatric IACI during fellowship. By comparison, 28 out of 94 (30%) of those who did not perform frequent IACI performed greater than 20 pediatric IACI during fellowship (p=0.002).

The demographic characteristics of those who performed frequent IACI were not different from those who did not. Specifically, there were no group differences in sex, practice setting (children's hospital versus other), years in practice, completion of a fellowship in pediatric rheumatology, or board certification in pediatric rheumatology. Those who performed frequent IACI evaluated more pediatric rheumatology clinic patients per week (median 31.25 *vs*. 20, p=0.003).

Respondents' beliefs regarding the disadvantages of and barriers to IACI therapy are presented in Table III. Those who performed IACI frequently were less likely to report disadvantages or barriers to IACI. Those who did not perform frequent IACI were more likely to report concern about the pain of the procedure, the availability of nursing or other medical support staff, and their own comfort with performing the procedure. This analysis was repeated comparing those who performed fewer than 20 IACI with those who performed

Table II. Recommendations for IACI by individual joint (n=124). Percentages refer to all respondents. Respondents may both personally inject and refer the same joint.

Joint	Recommend IACI	Inject personally	Refer to another physician
Knee	123 (99%)	112 (90%)	23 (19%)
Ankle	117 (94%)	86 (69%)	36 (29%)
Wrist	113 (91%)	87 (70%)	32 (26%)
Hip	106 (85%)	5 (4%)	103 (83%)
Elbow	106 (85%)	73 (59%)	38 (31%)
Shoulder	102 (82%)	41 (33%)	63 (51%)
TMJ	102 (82%)	3 (2%)	100 (81%)
Finger	100 (81%)	62 (50%)	40 (32%)
Subtalar	100 (81%)	35 (28%)	68 (55%)
MCP	96 (77%)	57 (46%)	39 (31%)
Sacroiliac	84 (68%)	5 (4%)	81 (65%)
MTP	83 (67%)	46 (37%)	39 (31%)
Toe	73 (59%)	42 (34%)	32 (26%)
Midfoot	73 (59%)	13 (10%)	61 (49%)
Sternoclavicular	58 (47%)	10 (8%)	49 (40%)

IACI: intra-articular corticosteroid injections; TMJ: temporomandibular joint; MCP: metacarpal-phalangeal; MTP: metatarsal-phalangeal.

Table III. Respondents' beliefs regarding disadvantages of and obstacles to IACI therapy (n=127). Respondents were asked to indicate the potential disadvantages of IACI that have the most significant impact on their utility for treating patients with JIA and the most significant obstacles in their practice to the performance of IACI. Totals may not add-up, as some respondents were unable to be categorized with respect to the number of IACI performed per year. P values refer to the comparison of greater than 50 IACI per year versus fewer than 50 IACI per year.

	All respondents	> 50 IACI per year	<50 IACI per year	p-value
Disadvantage				
No significant disadvantages	16 (13%)	7 (29%)	9 (9%)	0.009
Pain of procedure	55 (43%)	5 (21%)	47 (47%)	0.02
Patient anxiety	77 (61%)	11 (46%)	64 (65%)	0.09
Parent anxiety	88 (69%)	15 (63%)	71 (72%)	> 0.1
Infection risk	10 (8%)	1 (4%)	8 (8%)	> 0.1
Local corticosteroid adverse effects	28 (22%)	6 (25%)	20 (20%)	> 0.1
Systemic corticosteroid adverse effects	0 (0%)	0 (0%)	0 (0%)	> 0.1
Lack of efficacy	7 (6%)	0 (0%)	7 (7%)	> 0.1
Cost of procedure	27 (21%)	3 (13%)	22 (22%)	> 0.1
Obstacle				
No significant obstacles	61 (48%)	20 (80%)	41 (41%)	0.0007
Insufficient nursing/medical support staff	27 (21%)	1 (4%)	25 (25%)	0.03
Insufficient office support staff	7 (6%)	0 (0%)	6 (6%)	> 0.1
Insufficient means for patient sedation	42 (33%)	4 (16%)	36 (36%)	0.06
Lack of physician time	28 (22%)	2 (8%)	25 (25%)	0.10
Lack of physician comfort with procedure	16 (13%)	0 (0%)	15 (15%)	0.04
Inability to refer patients to another physician for IACI	4 (3%)	0 (0%)	3 (3%)	> 0.1
Inadequate re-imbursement for procedure	4 (3%)	1 (4%)	3 (3%)	> 0.1

IACI: intra-articular corticosteroid injections.

between 20 and 50 IACI. In this comparison, only lack of physician comfort was associated with performing fewer IACI. Of those who performed fewer than 20 IACI, 15 of 73 (21%) respondents lacked comfort with the IACI procedure. By comparison, of those who performed between 20 and 50 IACI, 0 of 26 (0%) respondents lacked comfort with the IACI procedure (p=0.01).

After controlling for the number of clinic patients evaluated per week using logistic regression, each of the following covariates remained significantly associated (p<0.05) with performing fewer than 50 IACI in the last year: lack of physician comfort, concern about the pain of the procedure, and the performance of fewer than 20 IACI during fellowship (data not shown).

Available patient sedation may be a factor in the performance of IACI. Overall, 98 out of 127 (77%) respondents reported access to a sedation unit that can facilitate IACI. Among those with access, 21 out of 98 (21%) responded that sedation was a major barrier to the performance of IACI in their practice, compared to 21 out of 29 (72%) of those without access. Sedation unit access was more common among respondents based in children's hospitals. Of those based in children's hospitals, 80 out of 97 (82%) had sedation unit access. By comparison, of those not based in children's hospitals, 17 out of 29 (59%) had sedation unit access (p=0.007). Those who performed frequent IACI were somewhat more likely to have access to a sedation unit. Of those who performed frequent IACI, 23 out of 25 (92%) had sedation unit access. By comparison, of those who did not perform frequent IACI, 73 out of 99 (74%) had access to a sedation unit (p=0.06).

Discussion

This is the first study to our knowledge to report details of the usage of IACI by pediatric rheumatologists, enabling physicians to compare their practices and beliefs to those of others. IACI are common in the treatment of JIA, being recommended by essentially all pediatric rheumatologists at some point in the treatment regimen. The 22% of respondents who performed greater than 50 pediatric IACI in the last 12 months perceived fewer disadvantages of and barriers to IACI therapy and received different training than those who performed IACI less frequently.

Although IACI are essentially universally accepted as effective in treating JIA, proficiency in the IACI procedure among pediatric rheumatologists is not universal. Our results suggest that fellowship programs should encourage trainees to complete at least 20 IACI and include knees, ankles, and wrists. Not surprisingly, lack of comfort with performing the IACI procedure was significantly associated with performing fewer IACI. According to this study, training in IACI is increasing, but 30% of recent trainees performed less than 20 pediatric IACI during their fellowships.

Many pediatric rheumatologists refer their patients to other physicians for IACI, particularly for joints that are more difficult to access, such the temporomandibular, sacroiliac, and hip. The successful use of ultrasound, fluoroscopy (8, 9), and computerized tomography (10) to guide intra-articular injections has been reported, but this questionnaire did not address their use.

IACI are likely to remain an important part of the future pharmacologic treatment of JIA. IACI have significant efficacy in oligoarthritis (2), and they may remain the definitive treatment for monoarthritis, a common pattern of joint involvement in JIA (11, 12). Many patients with JIA fail to achieve clinical remission, even in the era of biologic therapies (13). Arthritis in these refractory joints may benefit from targeted IACI. The safety and effectiveness of more than 10 concurrent IACI may warrant further investigation, as it has been performed by a significant minority of pediatric rheumatologists in this study.

This questionnaire study was limited by physician self-reporting and the possibility of responder bias.

In conclusion, IACI are essentially universally recommended in the treatment regimen for JIA. Differences in the usage of IACI among pediatric rheumatologists are associated with different perceptions of and training received in IACI therapy.

Acknowledgements

We thank Drs. Edward Behrens, Randy Cron, and Terri Finkel for piloting the questionnaire and all the respondents for their time and effort.

References

1. CLEARY AG, MURPHY HD, DAVIDSON JE: Intra-articular corticosteroid injections in juvenile idiopathic arthritis. *Arch Dis Child* 2003; 88: 192-6.
2. HASHKES PJ, LAXER RM: Medical treatment of juvenile idiopathic arthritis. *Jama* 2005; 294: 1671-84.
3. CRON RQ, SHARMA S, SHERRY DD: Current treatment by United States and Canadian pediatric rheumatologists. *J Rheumatol* 1999; 26: 2036-8.
4. BRUNNER HI, KIM KN, BALLINGER SH *et al.*: Current Medication Choices in Juvenile Rheumatoid Arthritis II -Update of a Survey Performed in 1993. *J Clin Rheumatol* 2001; 7: 295-300.
5. BEUKELMAN T, GUEVARA JP, ALBERT DA, SHERRY DD, BURNHAM JM: Variation in the initial treatment of knee monoarthritis in juvenile idiopathic arthritis: A survey of pediatric rheumatologists in the United States and Canada. *J Rheumatol* 2007; 34: 1918-24.
6. WALLACE CA: On beyond methotrexate treatment of severe juvenile rheumatoid arthritis. *Clin Exp Rheumatol* 1999; 17: 499-504.
7. SOUTHWOOD TR: Report from a symposium on corticosteroid therapy in juvenile chronic arthritis. *Clin Exp Rheumatol* 1993; 11: 91-4.
8. REMEDIOS D, MARTIN K, KAPLAN G, MITCHELL R, WOO P, ROONEY M: Juvenile chronic arthritis: diagnosis and management of tibiotalar and sub-talar disease. *Br J Rheumatol* 1997; 36: 1214-7.
9. BEUKELMAN T, ARABSHAHI B, CAHILL AM, KAYE RD, CRON RQ: Benefit of intraarticular corticosteroid injection under fluoroscopic guidance for subtalar arthritis in juvenile idiopathic arthritis. *J Rheumatol* 2006; 33: 2330-6.
10. ARABSHAHI B, DEWITT EM, CAHILL AM *et al.*: Utility of corticosteroid injection for temporomandibular arthritis in children with juvenile idiopathic arthritis. *Arthritis Rheum* 2005; 52: 3563-9.
11. GUILLAUME S, PRIEUR AM, COSTE J, JOB-DESLANDRE C: Long-term outcome and prognosis in oligoarticular-onset juvenile idiopathic arthritis. *Arthritis Rheum* 2000; 43: 1858-65.
12. CASSIDY JT, PETTY RE: Oligoarthritis. *In* CASSIDY JT, PETTY RE (Eds.) *Textbook of Pediatric Rheumatology*. 5th ed. Philadelphia: WB Saunders; 2005: 274-90.
13. WALLACE CA, HUANG B, BANDEIRA M, RAVELLI A, GIANNINI EH: Patterns of clinical remission in select categories of juvenile idiopathic arthritis. *Arthritis Rheum* 2005; 52: 3554-62.