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ORIGINAL STUDY

Intra-articular shoulder infiltrations. A study of Dutch and Flemish shoulder specialists.

Kristof Smeets, Wesley Appermans, Lene Feyen, Carl Dierickx

From Jessa Hospital, Hasselt, Belgium

It has been demonstrated that the use of echography during intra-articular shoulder infiltrations provides superior results. The correct infiltration technique and the related (contra-) indications are still under discussion. The authors' objective was to ascertain how intra-articular shoulder infiltrations are done in Holland and Flanders. An electronic questionnaire was answered by 35 members of the FLESSS (Flanders) and 30 members of the WSE (Netherlands) and was then processed statistically. Results : 21.54% of those questioned think they have sufficient experience with the use of echography during intra-articular infiltrations. 87.7% of the orthopaedists give a normal dose of corticoids to diabetes patients and more than 71% infiltrate when anticoagulants are used. Whereas 68.57% of the Flemish use posterior infiltration, 76.67% of the Dutch give an anterior injection. Conclusions : Echography is not used enough as an aid for intra-articular shoulder infiltrations. Neither diabetes mellitus nor anticoagulants are considered to be contra-indications. The Flemish shoulder specialists mainly administer posterior infiltration with methylprednisolone. The Dutch orthopaedists mainly administer anterior infiltration with triamcinolone.

Keywords : shoulder ; infiltration ; intra-articular ; echography

INTRODUCTION

Intra-articular shoulder infiltrations are treatments commonly performed by orthopaedic shoulder surgeons. The combination of a corticosteroid with a local anaesthetic has an important diagnostic and therapeutic function mainly for frozen shoulder, omarthrosis, post-traumatic injuries and rheumatoid arthritis (*3,18*).

A consensus does not exist in the literature about the correct infiltration technique. Various studies have demonstrated that an anterior intra-articular shoulder injection has the greatest effectiveness (*6, 12,13,19*). A recent review article states, however, that the posterior intra-articular infiltration technique is superior to the anterior (*5*). The literature is unequivocal about the use of echography for intra-articular infiltrations in the shoulder. Several studies have proven that there is a significant increase in accuracy, pain reduction and restoration of function in comparison with intra-articular shoulder infiltrations based solely on anatomic reference points (*2, 4,5,7,14-17*).

■ Kristof Smeets[1], MD.
■ Wesley Appermans[2], BS.
■ Lene Feyen[2], BS.
■ Carl Dierickx[1,2], MD.

[1] Orthopaedic Shoulder and Trauma Department, Jessa Hospital, Hasselt, Belgium

[2] Faculty of Medicine and Life Sciences, University of Hasselt, Belgium

Correspondence : Carl Dierickx, Jessa Ziekenhuis, Stadsomvaart 11, 3500 Hasselt, Belgium.

E-mail : carl.dierickx@pandora.be

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Table I. — Demographic data of the Flemish (Fl) and Dutch (Du) respondents. To be able to make a more representative comparison between various groups, the six groups were reduced to two groups, namely the group of doctors with less than or equal to 10 years of experience and a group with more than 10 years of experience

Number of years of experience	Fl	Du	**Total**	Fl (%)	Du (%)	Total (%)
<10 years	12	15	**27**	34.3	50.1	41.6
0-2 years	*0*	*5*	***5***	*0*	*16.7*	*7.7*
3-5 years	*4*	*8*	***12***	*11.4*	*26.7*	*18.5*
6-10 years	*8*	*2*	***10***	*22.9*	*6.7*	*15.4*
>10 years	23	15	**38**	65.7	50	58.4
11-15 years	*7*	*9*	***16***	*20*	*30*	*24.6*
16-20 years	*10*	*1*	***11***	*28.6*	*3.3*	*16.9*
>20 years	*6*	*5*	***11***	*17.1*	*16.7*	*16.9*
Total	**35**	**30**	***65***	**100**	**100**	**100**

Diabetes mellitus can be viewed as a contra-indication since studies have shown that an intra-articular cortisone injection can lead to a significant increase of the blood glucose level. This increase is of short duration, however, and disappears in a few days (*1,9-11*). Other possible contra-indications are bleeding disorders, fractures, impending tendon ruptures, bacteraemia or shoulder prostheses (*8*).

The purpose of this study is to determine whether there are significant differences in the way intra-articular shoulder infiltrations are performed by Belgian and Dutch shoulder specialists. Our null hypothesis is that all shoulder specialists make use of echography for IA infiltrations.

MATERIALS AND METHODS

Between March and May of 2012, the 81 Flemish members of the FLESSS (Flemish Elbow and Shoulder Surgeons Society) and the 90 Dutch shoulder specialists of the WSE (Workgroup : Shoulder and Elbow) were invited to participate in an online survey (SurveyMonkey). An e-mail reminder was sent after one month. The survey contained questions about infiltration techniques, indications, contra-indications, form of administration, use of echography, and amount of experience. Before the survey was distributed by means of an e-mail link, a trial test was conducted among a few colleagues to refine the questionnaire. In total, 19 questions were asked.

Two months after the first e-mail was sent, the results were collected and analysed with the aid of surveymonkey.com, Microsoft Office 2010 Excel and the statistical analysis programmes SAS and SPSS. When we obtained a percentage higher than 60% for an option in the answers, we used this as a threshold value for a generally accepted proposition. By means of chi² and Fisher exact tests, we looked for differences in the data at a significance level of 0.05.

A five-point Likert scale (very often, often, sometimes, seldom, never) was used in the questionnaire, which afterwards, before analysis, was transformed into a three-point scale (seldom, sometimes, often).

RESULTS

Demographic analysis

Sixty-five of the 171 shoulder specialists sent replies, a response ratio of 38%. The demographic data of the respondents are summarized in Table I.

Indications

Only frozen shoulder is generally accepted as indication for an IA shoulder infiltration (Table II). Injections are often given for centred omarthrosis and cuff tear artropathy as well, but here we see greater disagreement among the doctors. Post-traumatic arthritis, rheumatoid arthritis and biceps tendinopathy or partial tear are evenly distributed among the various categories. PASTA injury, SLAP injury, Bankart injury, biceps tendon luxation and subscapularis tendinopathy are seldom indications for a glenohumeral injection (Table II). There is not a significant difference between Flemish and Dutch orthopaedists with regard to any of the indications ($p < 0.05$).

Table II. — Assessment of the indication and the objective of an intra-articular shoulder infiltration. The underlined numbers show the most prevalent answer. A choice that appears more than 60% is considered to be a generally accepted position. These numbers are in bold face

Indication	Seldom (%)	Sometimes (%)	Often (%)	Therap. (%)	Diagn. (%)	Both (%)	N/A
Frozen shoulder	3.08	13.85	**83.08**	**67.69**	0.00	30.77	1.54
Omarthrosis, centred	15.38	40.00	44.62	**78.13**	0.00	15.63	6.25
Cuff Tear Arthropathy	30.77	20.00	49.23	**82.54**	0.00	3.17	14.29
Posttraumatic arthritis	30.77	36.92	32.31	54.69	6.25	25.00	14.06
Rheumatoid arthritis	29.23	30.77	38.46	**75.00**	1.56	7.81	15.63
PASTA injury Rotator Cuff	**61.54**	26.15	12.31	20.97	11.29	25.81	41.94
SLAP injury	**72.31**	20.00	7.69	6.35	12.70	25.40	55.56
Bankart injury	**95.38**	3.08	1.54	3.23	3.23	6.45	**87.10**
Biceps tendinopathy or partial tear	46.15	36.92	16.92	10.94	1.56	50.00	37.50
Biceps tendon luxation	**84.62**	13.85	1.54	4.84	0.00	19.35	**75.81**
Subscapularis tendinopathy	**75.38**	15.38	9.23	17.46	1.59	22.22	58.73

Table III. — A. Corticoid use with IDMM. B. Corticoid use with anticoagulants. In both tables there is no significant difference between Flemish (Fl) and Dutch (Du) speakers or between the different age groups

A. If your patient has Insulin Dependent Diabetes (DM type 1 or type 2), what do you do ?					
	Fl %	Du %	<10y %	>10y %	Total %
NO corticoid	5.71	3.33	0	7.89	4.62
NO corticoid, but a local anaesthetic with a diagnostic purpose	2.86	3.33	3.70	2.63	3.08
LOWER dose of corticoid and additional follow-up by an endocrinologist	2.86	6.67	3.70	5.26	4.62
NORMAL dose of corticoid and additional follow-up by an endocrinologist	88.57	86.67	92.59	84.21	87.69

B. Together with which anticoagulants do you venture to inject ?					
	Fl %	Du %	<10y %	>10y %	Total %
Aspirin	94.29	86.67	88.89	92.11	90.77
Platelet aggregation inhibitor	82.86	76.67	77.78	81.58	80.00
Coumarone derivative	80.00	73.33	85.19	71.05	76.92
LMWH	94.29	86.67	88.89	92.10	90.77

The injections for frozen shoulder, centred omarthrosis, cuff tear artropathy and rheumatoid arthritis are mainly therapeutic. Fifty percent of the orthopaedists hope to accomplish both purposes, therapeutic and diagnostic, after an injection for a biceps tendinopathy or partial tear (Table II).

Contra-indications

Eighty-seven point seven percent of the doctors queried, administer a normal corticoids injection to patients with diabetes mellitus type I and II and advise that the glucose level be checked by the patient's endocrinologist. A minority of 12.3% give these patients no corticoids or a lower dose (Table III.A).

From queries in connection with patients who follow an anticoagulant therapy, it emerges that the general majority of the doctors (> 71%) still venture to give a glenohumeral injection. When the patient is taking an aspirin preparation or is being treated with low molecular weight heparin (LMWH),

Table IV. — A. Injection technique. B. Subjective precision. A significant difference between Flemish (Fl) and Dutch (Du) speakers, and between the various age groups, is shown in bold face

A. Method of injection	Fl (%)	Du (%)	<10y (%)	>10y (%)	Total (%)
anterior	**68.57**	13.3	37.04	47.37	43.07
posterior	25.71	**76.67**	51.85	47.37	49.23
radiologist	5.71	10	11.11	5.26	7.69
	100	100	100	100	100
B. Subjective precision					
40%	0	0	0	0	0
50%	5.71	3.33	7.41	2.63	4.62
60%	0	10	7.41	2.63	4.62
70%	11.43	13.33	14.81	10.53	12.31
80%	31.43	20	29.63	23.68	26.15
90%	45.71	50	37.04	55.26	47.69
100%	5.71	3.33	3.71	5.26	4.62
	100	100	100	100	100

injections are given even by 90.77% of the doctors providing treatment. With a platelet aggregation inhibitor, 80% of those queried inject and with a coumarone derivative 76.92% of the orthopaedists venture to inject (Table III.B).

Infiltration technique

A significant difference is observed between the members of the FLESSS who prefer the anterior technique (68.57%) and the members of the WSE who use the posterior technique (76.67%). Only one person gives posterior infiltration with the patient in the prone position. When we divide the sample survey into two groups according to the number of years of experience, no significant difference is found in the two glenohumeral infiltration techniques (Table IV.A). A lateral IA shoulder infiltration is used by no one. A small minority have the IA infiltrations performed by a radiologist. (Table IV.A)

When the orthopaedists are asked to what extent they are subjectively 'certain' that the glenohumeral injection given is correctly placed in the joint capsule, it turns out that 73.84% of the entire sample survey think that the needle is positioned correctly in from 80 to 90% of the cases (Table IV). Between the FLESSS members and the WSE members there is no significant difference with regard to their precision, and their accuracy corresponds with that of the entire sample survey. There is no significant difference between the estimated precision of the orthopaedists with less than 10 years of experience and the orthopaedists with more than 10 years of experience (Table IV.B). The technique used was taught them by an orthopaedic surgeon in a peripheral non -university hospital for 57.14% of the FLESSS members and 63.33% of the WSE members.

Echography

The majority of the orthopaedists have little or no personal experience with echography as a diagnostic tool in the shoulder area (73.85%). Fifty percent (50.00%) of the Dutch orthopaedists (WSE) have reasonable to sufficient experience with ultrasound guided injections in the shoulder area. This compares with 22.86% of the Flemish orthopaedists (FLESSS). But only 21.54% of all persons questioned think they have sufficient experience with ultrasound guided injections. Injection would not be considered more often if one had greater precision.

Of all persons questioned, 89.23% agree entirely or partially with the statement that echography can help during the injection procedure and 66.15% agree entirely or partially with the statement that

Table V. — Use of various types of corticoid for IA infiltrations.
Each person could select several options

Corticoid	Fl (%)	Du (%)	< 10y (%)	> 10y (%)	Total (%)
Triamcinolone	0	74.19	37.5	22.92	35.4
Betamethasone	34.69	0	12.5	25	26.2
Methylprednisolone	65.3	25.81	50	54.17	61.5
Dexamethasone	0	0	0	0	0
Combination preparation useful	22.9	10	7.4	23.7	16.9

they would like to learn more about it. Seventy-two point thirty-one percent agree from partially to entirely that their professional association ought to play a role in teaching this technique.

Medication used

Methylprednisolone is infiltrated by 61.54% of the orthopaedists, including 80% of the Flemish FLESSS members. Betamethasone is used by only 26.15% of all orthopaedists and only by members of the FLESSS. Triamcinolone is used by 74.19% of the WSE members. A small group (16.9%) find that a combination preparation of an anaesthetic and a corticoid can be useful (Table V).

Methodological considerations

This study has various limitations. A first important limitation is the relatively low number of respondents. With 65 replies there are however, as we see it, sufficient data to be able to make a representative comparison, yet more than half of the shoulder specialists did not respond. A possible explanation for this could be that the older generation of shoulder specialists is less familiar with the electronic form of the survey. We notice no significant difference in ages, however. Since we have subdivided the sample survey further, first between the Flemish (*35*) and Dutch (*30*), and second between orthopaedists with less than 10 years of experience (*27*) and more than 10 years of experience (*38*) we must express the reservation that the new sample survey sizes do not agree and thus will not be optimally representative when we compare them with each other.

CONCLUSION

The most important finding from our study is that echography, in spite of its proven effectiveness, is not yet used sufficiently for intra-articular shoulder infiltrations in Holland and Flanders. Although the Dutch have significantly more experience with ultrasound guided injections, the majority of both groups makes no use whatever of this resource. Our null hypothesis can therefore be rejected since only 21.5% of all persons questioned indicate that they have sufficient experience with it. It is remarkable that 89.23% of those questioned are familiar with the literature and are entirely or partially persuaded that echography can help during the injection procedure. A great responsibility rests on the shoulder specialists at the training centres and on the professional groups, since more than half indicated that they would like to learn more about the procedure in the form of a course. There is thus a great interest in ultrasound guided injections, but it would not significantly change the frequency of shoulder injections.

The temporary increase of the blood glucose level of diabetics is evidently only a theoretical concern. We point out, however, that a large majority do not view this as a contra-indication, and will not deviate from their assessment of the indication and also will not reduce the dosage. The same attitude is maintained by the orthopaedists if the patient takes any anticoagulants whatever.

Significant differences are observed between the members of the two different professional groups. Although both speak the same language, their education is different in Belgium (FLESSS) and the Netherlands (WSE). Thus the members of the

FLESSS mainly administer anterior infiltration, making use of methylprednisolone, whereas the members of the WSE mainly use posterior infiltration with triamcinolone. An unequivocal opinion does exist about the assessment of the indication for an intra-articular shoulder infiltration, with frozen shoulder being the only generally accepted indication.

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