DIAGNOSTIC INFILTRATION OF THE HIP JOINT WITH BUPIVACAIN IN ADULT ACETABULAR DYSPLASIA

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The authors performed a double-blind randomized study considering the use of selective infiltration of the hip joint with bupivacain 0.5% as a diagnostic tool in mild and moderate acetabular dysplasia in the adult. In 40 patients with symptomatic acetabular dysplasia the hip joint was infiltrated with either bupivacain 0.5% or placebo in a double-blind setting. Patients were scored for pain before the injection and for pain relief on a visual analogue scale (VAS) immediately after the injection and after two weeks. There was no statistically significant difference between the two groups for pain relief and duration of pain relief. Duration of pain relief waa significantly related to severity of pain before the injection. Diagnostic infiltration of the hip joint with bupivacain in mild and moderate acetabular dysplasia does not prove to be a reliable diagnostic aid in the decision to treat this condition operatively. However, it might be valuable in cases with advanced osteoarthritis : further studies should be undertaken.

Keywords : acetabular dysplasia ; hip ; infiltration ; bupivacain.
Mots-clés : dysplasie acétabulaire ; hanche ; infiltration ; bupivacaïne.

INTRODUCTION

It is now commonly accepted that untreated severe acetabular dysplasia will eventually lead to osteoarthritis. The necessity to treat this condition is not debated. There is however considerable disagreement regarding the treatment of mild and moderate acetabular dysplasia. Wiberg (7), Murray (4), Cooperman *et al.* (1) and Harris (2) studied the etiology of primary osteoarthritis of the hip, and data from their reports clearly indicate that in most cases so-called idiopathic osteoarthritis actually is secondary to acetabular dysplasia. A CE angle of 25° or less was considered to indicate an imperfectly formed acetabulum.

Criteria which are objective and appropriate to evaluate mild and moderate acetabular dysplasia are mainly radiographic, as Murphy *et al.* (3) recently described. A prospective double-blind study was undertaken to evaluate hip joint infiltration with bupivacain as a diagnostic tool.

MATERIALS AND METHODS

Forty patients with symptomatic acetabular dysplasia were selected, consecutively numbered and scheduled for hip infiltration after informed consent. There were 10 males and 30 females with an average age of 33 years (18 to 50). Radiographic measurement of the CE angle was performed on plain AP view of the pelvis, which is reasonably accurate (5). CE angles of 25° and less were included in the study. Patients with osteoarthritis were excluded. Pain was scored on a visual analogue scale (VAS) of 1 to 10 before the injection and classified as mild (1 to 3), moderate (4 to 7) and severe (8 to 10).

Two identical series of 40 vials (5 ml) containing either bupivacain 0.5% or NaCl 0.9% were prepared in our hospital pharmaceutical department. The second series of vials was used only as emergency backup. An independent pharmacologist kept the code of each numbered vial. All vials were consecutively numbered and administered to each consecutive patient in a standard fashion.

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With the patient in a supine position under fluoroscopy an 18-gauge needle was introduced into the hip joint using a lateral supratrochanteric approach. The needle position was verified with intra-articular injected radiograph dye, and a radiograph was taken to confirm the appropriate needle position. The contents of a numbered vial were then injected into the hip joint.

Each radiograph was reviewed by an independent radiologist. Criteria for intra-articular needle position were dye located in the joint space, dye on the medial side of the femoral neck and absence of extra-articular dye. Immediate pain relief was scored on a VAS of 1 to 10. After 14 days the patient was again scored for pain relief and duration of pain relief. A ruler was used to measure the point on the VAS in centimeters, giving values of 1 to 10. The actual contents of each vial were not known to patient or investigator until 2 weeks after the administration of the last vial. All infiltrations were performed by 2 investigators (MS and CvG).

Statistical analysis

Patients were subdivided into group 0 (bupivacain) and group 1 (placebo). The statistician received all measurements of pain severity before the injection and pain relief after the injection. Randomization for pain severity was tested by a Chi-square test. Pain relief and duration of pain relief for both groups were tested by Mann-Whitney U-Wilcoxon Rank Sum W Test. Kruskal-Wallis 1-way ANOVA was used to correlate duration of pain relief and pain severity before the injection.

RESULTS

The mean age of patients was 31.5 years (18 to 50) in the bupivacain group and 33.5 years (18 to 50) in the placebo group. Pain scores before the injection are listed in table I. Most patients had groin pain or thigh pain. The mean CE angle was 18° (O to 25°) in the placebo group and 19° (O to 25°) in the bupivacain group. In all patients the needle proved to be in the hip joint during the infiltration procedure.

Scores on the VAS for immediate pain relief and pain relief after 14 days are shown in tables II and III. Duration of pain relief in both groups is listed in table IV.

Table I. — Initial pain scores on VAS

Score on VAS	Group O (bupivacain)	Group 1 (placebo)
Mild (1-3)	5	6
Moderate (4-7)	11	9
Severe (8-10)	4	5

Table II. — Immediate pain relief scores on VAS

Score on VAS in cm	Group O (bupivacain)	Group 1 (placebo)
1.0	1	5
1.1	5	7
1.2	7	-
1.3	-	3
4.0	-	2
4.5	1	-
5.0	1	-
5.3	1	-
6.5	1	-
7.0	1	1
8.0	1	1
9.4	1	-
10.0	-	1
	20	20

1 = no pain relief ;
10 = complete pain relief.

Table III. — Pain relief scores on VAS after 14 days

Score on VAS in cm	Group O (bupivacain)	Group 1 (placebo)
1.1	5	3
1.2	4	3
1.3	3	2
1.5	-	1
2.5	1	-
5.5	1	1
6.0	-	1
6.8	1	-
7.0	-	1
7.5	1	-
8.0	-	1
9.0	1	1
9.6	-	1
10.0	3	5
	20	20

1 = no pain relief ;
10 = complete pain relief.

Table IV. — Duration of pain relief

Number of days	Group O (bupivacain)	Group 1 (placebo)
0	13	9
1	1	1
2	-	1
3	1	1
4	1	2
7	1	3
8	1	-
12	2	-
14	-	3
	20	20

Patients were well randomized for age and initial pain score on the VAS in both groups (Chi-square test). There was no statistically significant difference between the two groups for immediate pain relief, pain relief measured 2 weeks after injection and duration of pain relief (Mann-Whitney U-Wilcoxon Rank Sum W test).

Pain severity before the injection related to immediate pain relief or pain relief after 2 weeks was not significantly different in the two groups. There was however a significant relation in both groups between pain score before the injection and duration of pain relief after hip infiltration (Chi-square = 7.7 ; p = 0.02 ; positive Kruskal-Wallis test).

DISCUSSION

The natural history of adult acetabular dysplasia in the absence of subluxation is difficult to predict (6). Usually there is only slight discomfort, or physical signs are lacking. It is however now accepted that acetabular dysplasia can lead to pathological mechanics of the hip joint and thus to early osteoarthritis. Frequently the surgeon is tempted to treat this condition operatively to remodel the joint and to produce a stable and congruent hip.

Radiographic morphologic criteria allow the surgeon to classify the acetabular dysplasia. In the patient with mild or moderate acetabular dysplasia and minor symptoms, it is often difficult to decide whether or not to treat the patient operatively. In the present study we tried to evaluate hip infiltration with bupivacain as an objective criterion for symptomatic mild and moderate acetabular dysplasia. We assumed that bupivacain could produce the same analgesic effects as in joints with cartilage degeneration and osteoarthritis.

In a randomized population with symptomatic mild and moderate acetabular dysplasia and tested in a double-blind setting, this study showed no statistically significant differences in pain relief after hip infiltration with bupivacain or placebo. Duration of pain relief was actually significantly related to severity of pain before the injection in patients infiltrated with bupivacain and patients injected with placebo.

The mechanism that produces pain in acetabular dysplasia is still unknown. Unfavorable mechanics probably give rise to instability of the joint and possibly to a pathologic acetabular labrum. Load of a certain severity could then produce discomfort. In early stages of acetabular dysplasia cartilage degeneration is usually absent and does not account for pain production.

The subjective result of hip infiltration with bupivacain in mild and moderate acetabular dysplasia is not a reliable parameter to help the surgeon decide to treat this condition operatively.

In this study the negative findings might result from the fact that the labrum was not reached with the local anesthetic. Moreover, the test might be valuable in cases with advanced osteoarthritis ; further study is warranted.

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SAMENVATTING

M. SPRUIT, C. J. F. VAN GOETHEM, M. A. P. KOOIJMAN, P. W. PAVLOV. Diagnostische infiltratie van de heup met bupivacaïne bij volwassenen met acetabulaire dysplasie.

Een dubbelblinde gerandomiseerde studie werd uitgevoerd naar het gebruik van selectieve infiltratie van het heupgewricht met bupivacaïne 0.5% als diagnostische modaliteit bij patiënten met milde en matige acetabulaire dysplasia. Bij 40 patiënten met symptomatische acetabulaire dysplasie werd het heupgewricht dubbelblind geïnfiltreerd met ofwel bupivacaïne 0.5% ofwel een placebo. Pijn voor de injectie en reductie van pijn na de infiltratie werden gescoord op een visueel analoge schaal.
Er bleek geen statistisch significant verschil te bestaan tussen de 2 groepen van 20 patiënten in mate van pijn, verlichting en de duur daarvan. De duur van pijn vermindering was daarentegen significant gerelateerd aan de ernst van de pijn voor de injectie ($p = 0.02$). Infiltratie van het heupgewricht met bupivacaïne 0.5% bij patiënten met symptomatische milde en matige acetabulaire dysplasie is geen betrouwbaar diagnosticum en helpt de chirurg niet te besluiten deze aandoening operatief te behandelen. Dit sluit niet uit dat de test eventueel waardevol zou kunnen zijn bij duidelijke arthrose.

RÉSUMÉ

M. SPRUIT, C. J. F. VAN GOETHEM, M. A. P. KOOIJMAN, P. W. PAVLOV. Infiltration diagnostique à la bupivacaïne dans la dysplasie acétabulaire chez l'adulte.

Les auteurs ont effectué une étude randomisée en double aveugle concernant l'infiltration sélective de la hanche avec de la bupivacaïne à 0.5% comme épreuve diagnostique dans la dysplasie cotyloïdienne légère à modérée chez l'adulte. Chez 40 patients présentant une dysplasie symptomatique, la hanche a été infiltrée en double aveugle soit avec de la bupivacaïne à 0.5% soit avec un placebo. La douleur a été evaluée sur une échelle visuelle (VAS) immédiatement après et 2 semaines après l'infiltration.
Il n'y avait pas de différence significative entre les deux groupes quant à la sédation de la douleur et la durée de cette sédation. La durée de la sédation de la douleur était significativement liée a la sévérité de la douleur avant l'infiltration dans les 2 groupes.
L'infiltration diagnostique de la hanche à la bupivacaïne n'apporte pas d'information valable pour l'indication d'un traitement chirurgical de la dysplasie cotyloïdienne légère ou modérée. Ceci n'exclut pas que le test puisse avoir de la valeur en cas d'arthrose établie.