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3 **Treatment of chronic osteoarthritic hip pain with phenol neurolysis of the obturator nerve**
4 **Quadfen 1**

5

6 **Tratamento da dor crônica na osteoartrite do quadril com neurólise do nervo obturador**
7 **com fenol Quadfen 1**

8

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22 ABSTRACT

23 The conservative treatment of osteoarthritis (OA) of the hip is essentially symptomatic, seeking
24 to relieve pain and optimize function. Despite presenting great clinical effect, hip arthroplasty
25 may have restrictions, and in these situations, the neurolytic blockade of the anterior branch of
26 the obturator nerve can be a therapeutic alternative, since it stops the afferent pain from the hip
27 joint. **Objective:** To describe the results of treating patients with severe OA of the hip by applying
28 phenol to the obturator nerve. **Method:** Twelve consecutive patients with OA of the hip,
29 refractory to conservative treatment, were recruited to have the obturator nerve localized
30 through electrostimulation and blocked with phenol. They were evaluated in terms of pain
31 intensity via the visual analogue scale (VAS), pressure dolorimetry in the medial and lateral
32 gluteus medius, gluteus minimus, and piriformis, and quality of life by the Harris Hip Score (HHS)
33 at baseline (BL) after 1 (M1), 2 (M2), and 6 months (M6). **Results:** The patients were between
34 30 and 72 years old with an average of 47.5 ± 1.7 years old, 5 of them were women. Three
35 patients were excluded for not being able to come for follow up evaluations. VAS values varied
36 from 8.2 ± 0.9 at BL to 6.6 ± 1.7 at M1, 6.5 ± 1.7 at M2, and 7.3 ± 1 in M6 ($p=0.0094$). As to the
37 HHS, the values were BL: 33.27 ± 2.9 ; M1: 39.2 ± 6.4 ; M2: 40.2 ± 8.1 , and M6: 38.8 ± 9.7 in the
38 final evaluation ($p=0,040$). For dolorimetry, non significant variation was BL: 11 ± 5.7 , M1:
39 7.9 ± 2.2 ; M2: 10.9 ± 5.6 ; M6: 8.1 ± 1.6 ($p 0.69$). **Conclusion:** The application of phenol to the
40 anterior branch of the obturator nerve can be an alternative in the treatment of severe OA of the
41 hip in patients with restrictions to Total Hip Replacement (THR), since it reduces pain and
42 improves quality of life.

43

44 **Keywords:** Osteoarthritis, Hip, Pain, Rehabilitation, Therapeutics, Phenol, Quality of Life

45

46 **RESUMO**

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47 O tratamento conservador da osteoartrite (OA) do quadril é essencialmente sintomático,
48 visando alívio da dor e otimização da funcionalidade. Apesar de apresentar grande efeito
49 clínico, a artroplastia quadril pode ter restrições, nestas situações o bloqueio do ramo anterior
50 do nervo obturador (RAO) pode ser uma alternativa terapêutica, uma vez que interrompe a
51 aferência dolorosa da articulação do quadril. Objetivo: Descrever os resultados do tratamento
52 de pacientes com OA grave do quadril por meio da aplicação de fenol no nervo obturatório.
53 Método: Nove pacientes com OA de quadril resistente ao tratamento conservador que se
54 apresentaram consecutivamente ao nosso serviço foram submetidos à aplicação de fenol no
55 nervo obturatório com localização por meio de eletroestimulação e avaliados quanto a
56 intensidade de dor pela escala visual analógica (EVA), dolorimetria de pressão e qualidade de
57 vida pelo *Haris Hip Score* (HHS) após 01, 02 e 06 meses. Resultados: Foram selecionados 12
58 pacientes que preenchem os critérios de inclusão e exclusão, destes, 3 foram excluídos após
59 não conseguirem mais comparecer para as avaliações. Os valores médios de EVA variaram de
60 $8,2 \pm 0,9$ na medida basal para $6,6 \pm 1,7$ ao final de um mês, $6,5 \pm 1,7$ ao final de dois meses
61 e $7,3 \pm 1$ com 06 meses ($p=0,0094$). Quanto ao HHS, os valores foram $33,27 \pm 2,9$; $39,2 \pm 6,4$;
62 $40,2 \pm 8,1$ e $38,8 \pm 9,7$, na avaliação final. A última variável analisada foi a Dolorimetria, onde
63 foi realizada a média entre os valores atingidos pela avaliação com o dolorímetro no glúteo
64 médio medial, glúteo médio lateral, glúteo mínimo e piriforme. Na avaliação inicial média de
65 $11 \pm 5,7$, $7,9 \pm 2,2$ no final do primeiro mês, $10,9 \pm 5,6$ no segundo e no 6º mês $8,1 \pm 1,6$. Ao
66 aplicarmos o teste ANOVA, não foi observado diferença estatística ($p 0,69$). Conclusão: A
67 aplicação de Fenol em RAO pode ser uma alternativa no tratamento da OA de quadril grave
68 em pacientes com restrições à realização de ATQ, pois implica em redução da dor e melhora
69 da qualidade de vida.

70

71 **Palavras-chave:** Osteoartrite do Quadril, Dor, Reabilitação, Terapêutica, Fenol, Qualidade de
72 Vida

73

74 INTRODUCTION

75

76 The conservative treatment of osteoarthritis (OA) of the hip is essentially symptomatic, seeking
77 to relieve pain and optimize function.¹ The consensus for therapy consists of non-
78 pharmacological treatments such as exercise, correcting misalignments, and pharmacological
79 treatments such as analgesics, anti-inflammatory drugs, opioids, capsaicin cream, and
80 injections with glucocorticoids and hyaluronic acid.²

81

82 When the clinical treatment fails, a surgical approach with hip arthroplasty may be
83 recommended. The greatest concern is that the surgery is major and can be risky for patients
84 with other diseases. As osteoarthritis of the hip is common in older age groups and in patients
85 with greater body weight, the prevalence of comorbidities that may increase surgical risk is also
86 greater.³ In these cases the use of a conservative treatment may be advisable, even if less
87 efficient, because of safety issues and morbidity.

88

89 Another problem that afflicts patients in the Brazilian health system is the lack of resources,
90 which results in a lack of surgical material and long waiting lists for surgical intervention. Under
91 these conditions the neurolytic blockade of the obturator nerve can be used as a palliative
92 analgesic therapy.⁴

93

94 Greater duration of the blockade can be achieved if drugs capable of harming the nerve axons
95 are used. Phenol has an immediate local anesthetic action, due to its immediate selective effect
96 on smaller nerve fibers.^{5,6}

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97 **OBJECTIVE**

98

99 This study sought to describe the results of treating patients with severe osteoarthritis of the hip,
100 refractory to conservative treatment, for pain relief and quality of life, through the application of
101 phenol to the anterior branch of the obturator nerve.

102

103 **METHOD**

104

105 This study was approved by the research ethics committee of the institution, and all participants
106 signed the free and informed consent form. Consecutive outpatients followed in the HCRP hip
107 clinic were recruited if they met the following inclusion criteria:

108

- 109 • Older than 18 years-old.
- 110 • Both genders.
- 111 • Diagnosed with osteoarthritis of the hip (hip pain associated with at least two of the following:
112 VHS<20mm/h, osteophytes in the femur or acetabulum or reduction of articular Reduction of
113 joint space in the acetabulum in rx).
- 114 • Failure of conservative treatments with therapeutic exercise, modalities, walking aids,
115 remedies (analgesics or anti-inflammatory drugs), or with trigger-point blockades.
- 116 • Pain assessed by the Visual Analogue Scale greater than 6 at the time of evaluation.
- 117 • Not having any known allergy to phenol or uncontrolled coagulopathy.

118

119 The exclusion criteria were:

120

- 121 • Having been submitted to total hip replacement (THR) or any other surgical procedure in the
122 lower limbs after inclusion in the study.
- 123 • Limited understanding of the procedures or evaluation instruments.
- 124 • Difficulty in clinical follow-up or coming in for evaluations for any reason.

125

126 In this study, patients were evaluated at the time of recruitment as well as immediately before
127 the phenolic blockade (baseline - BL), then at 1 month (M1), 2 months (M2), and 6 months (M6)
128 after the intervention. The following assessment instruments were used:

129

- 130 • The visual analogue scale (VAS), which consists of a straight line of 100 mm anchored at the
131 ends in the expressions 'no pain' and 'worst pain possible' on which the patient indicates the
132 intensity of their pain symptom. The intensity of the pain is considered as the distance in
133 centimeters from the end 'no pain' to the point where the patient has indicated his pain.⁷
- 134 • Pressure dolorimetry (PD) is the imposing of progressively more intense pressure at a steady
135 rate of about 1 kgf/cm²/s, on trigger points identified by muscle palpation, with a
136 dynamometer that has a circular, rubberized 1cm² standardized end until the patient
137 manifests pain.⁷
- 138 • The functional questionnaire Harris Hip Score (HHS) consists of four items: pain in the
139 affected joint, function, presence or absence of deformity, and the range of motion of this
140 joint. The function is assessed by asking about the patient's activities of daily living and gait,
141 whether the patient presents with claudication or needs external support, and the maximum
142 distance he can walk. The score may range from 0 to 100, where the lower the score, the
143 greater the functional impairment of the patient.⁸
- 144
- 145
- 146

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147 The treatment was performed with application of phenol in the anterior branch of the obturator
148 nerve. A Braun Stimuplex HNS 12 electrostimulator was used along with a Stimuplex A
149 0.8X75mm needle which was inserted two fingers from the inguinal region, just below the ventral
150 muscle of the adductor longus, with the tip of the needle pointing to the antero superior iliac
151 spine on the same side.

152
153 An electrical current of 2mA and 1 Hz helped to locate the nerve, which resulted in rhythmic
154 contraction of the adductor muscles concomitant in the same frequency. Maintenance of
155 contractions after decrease of current intensity to 1mA confirmed the tip of the needle positioned
156 in close contact with the obturator nerve. Nerve block consisted in the injection of 2.5ml of 6%
157 phenol. After the application, the patient was also evaluated on whether or not he needed gait
158 support, to continue the therapeutic measures in use, and was counselled as to analgesics and
159 maintaining physiotherapy, if necessary.

160
161 Quantitative variables were assessed for normality by the Kolmogorov-Smirnoff and described
162 by the mean and standard deviation. Categorical variables were grouped into categories and
163 expressed in percentages. Any incomplete data from clinical follow-up spreadsheets were filled
164 in a conservative manner with the LOCF technique (last observation carried forward). The
165 clinical measures of the effect of therapeutic intervention were analyzed by ANOVA for repeated
166 measures and, where significant, there was a post hoc comparison between moments of
167 evaluation by the paired t test. The significance level was 0.05.

168 169 RESULTS

170
171 Twelve patients were selected who met the inclusion and exclusion criteria and agreed to
172 participate. The patients were between 30 and 72 years of age, with an average of 47.45 ± 1.7 ;
173 time with the disease between 2 and 16 years, with failures in conservative treatment using
174 analgesics such as dipyrone, paracetamol, tramadol and codeine, as well as physiotherapy with
175 THR recommended. One month after the procedure one patient could no longer participate in
176 the study, followed by 2 other patients after the third evaluation, due to transportation problems.

177
178 Among the 12 patients at the beginning of the study, 5 were female and 7 males. After the
179 application, all patients reported improvement of symptoms. Only one patient reported loss of
180 motor strength in the adductor muscles: a foreseeable side effect of the procedure.

181
182 Concerning pain intensity, in the initial assessment, prior to the application of phenol to the
183 anterior branch of the obturator nerve, the patients had a mean of 8.2 ± 0.9 . with a drop to $6.6 \pm$
184 1.7 and remained stable with a slight increase in the sixth month (7.3 ± 1). A p-value of 0.009 was
185 found when the ANOVA test was applied. When the results were analyzed in relation to the
186 HHS, a baseline mean of 33.27 ± 2.9 was found in the HHS, with improvement of the score after
187 the first and second month, and a slight decrease in the sixth month (38.8 ± 9.7) and p-value of
188 0.040.

189
190 The last variable analyzed was for dolorimetry, where the mean of the values was calculated for
191 the assessment of pain in the medial and lateral gluteus medius, gluteus minimus, and piriformis.
192 In the baseline evaluation they showed a mean of 11 ± 5.6 and a worsening of the score in the
193 evaluation after 1 month (7.9 ± 2.2) and slight improvement afterwards (8.1 ± 1.6 in the sixth
194 month). When applying the ANOVA test, there was no statistical difference observed (p 0.69)
195 (Table 1).

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197 **Table 1.** Clinical evolution of patients with hip osteoarthritis in a 6 months period following the
198 application of phenol to the anterior branch of the obturator nerve
199

	Baseline	Month 1	Month 2	Month 6	P
N	12	12	11	9	
EVA	8,2 ± 0,9	6,6 ± 1,7*	6,5 ± 1,7*	7,3 ± 1,0* §	0,009
HHS	33,0 ± 2,9	39,2 ± 6,4*	40,2 ± 8,1*	38,8 ± 9,7*	0,04
DP	11,0 ± 5,7	7,9 ± 2,2	10,9 ± 5,6	8,1 ± 1,6	0,694

200 *Legend — VAS: visual analogue scale; HHS: Harris Hip Score. PD: pressure dolorimetry. * difference in relation*
201 *to the baseline value p<0.05; §: difference between 2 and 6 months p<0.05*
202

203 DISCUSSION

204
205 Nerve blockades are therapeutic strategies in the treatment of chronic pain. Nerve blockades
206 can be applied when a patient presents pain in joints or even muscles. The alleged therapeutic
207 mechanism is the interruption the nociceptive path from their origin, blocking the conduction of
208 nerve impulses.⁹ The analgesic effect of these procedures may be permanent or temporary by
209 interrupting the vicious cycle of pain.

210
211 Phenol has been used in the treatment of pain since 1936 as a neurolytic agent applied via
212 intrathecal or epidural routes, or directly on the nerves.^{6,10} It causes nerve destruction by
213 inducing protein precipitation. There is a loss of cellular elements, separation of the myelin
214 sheath from the axon and axonal edema. The substance takes immediate effect by its selective
215 effect on small nerve fibers.¹¹ Because of these properties, phenol was chosen for the neurolysis
216 of the anterior branch of the obturator nerve. In a study conducted by Monagle & Ee⁶ a 3ml intra-
217 articular injection was applied to the hip, with improvement of pain and mobility, and after 1 year
218 the patient was sent for a repeat procedure.

219
220 Silva et al.⁴ blocked the obturator nerve with 10ml of 0.25% bupivacaine and obtained a 100%
221 improvement in the pain and function of one patient after the procedure, who reported
222 independence for all activities, with the analgesic effect lasting for 40 days.

223
224 The patients in the present study had severe OA of the hip, were refractory to clinical treatment,
225 and complained of severe pain and many functional limitations. The results showed pain
226 improvement by patients, who complained about intense pain, especially during the first 2
227 months after the blockade, with a difference of 2 points from the initial VAS and a subsequent
228 stabilization. But in the third assessment there was a slight regression of the score, concurrent
229 with the patients complaining of pain once again, a fact that may be related to the duration of
230 the phenol effect, since its effects are not permanent and a functional re-innervation occurs over
231 a period of months-usually between 2 and 6 months. The time of action of this procedure varies
232 with the concentration, injected volume, duration of exposure, and injection technique.

233
234 If the phenol is injected near nerves that have a predominance of sensory fibers, it may cause
235 dysesthesia or anesthesia that can last up to 4 months.¹² In the study there was only one
236 complain about side effects, 1 patient said that felt lost of motor strength but no lost in function
237 and no dysesthesia. The improvement in the HHS happened in terms of mobility, with larger
238 angles achieved in goniometry, as well as in the perception of ease in activities like tying shoes,
239 taking a bus, and going up and down stairs.

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241 Regarding the dolorimetry parameter, although no statistical difference was found, the patients
242 presented a mild worsening of pain perception which, according to Imamura et al.¹³ can be
243 associated with the myofascial pain syndrome, a condition associated with weakness and
244 muscle shortening, which is common in patients with OA of the hip, especially in the areas being
245 evaluated such as the piriformis, gluteus medius and minimus, and hip adductor muscles. The
246 patients in the study had struggle with pain for long periods of time, already with a chronic pain,
247 affecting other joints, altering the dynamic of walk and resulting in more myofascial syndrome.

248
249 The present study had some limitations, such as the lack of a control group and the sample size.
250 Another bias was the large number of comorbidities in the patients, with many already having
251 osteoarthritis elsewhere, such as gonarthrosis and widespread pain, which affects the pain
252 perception of the patient and would require a more comprehensive treatment; this would include
253 providing gait supports, which in the Brazilian Health System can take up to 6 months to obtain,
254 or the need to continue with physical therapy, where there is also a lack of time slots and
255 professionals in the public network.

256 257 CONCLUSION

258
259 The application of phenol to the anterior branch of the obturator nerve can alleviate the pain and
260 improve the quality of life in patients with hip OA, being an alternative treatment for patients who
261 have not undergone THR, either because they lack the clinical conditions or because of long
262 waiting lists for the procedure.

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