EVALUATION OF THE RELIABILITY OF THE MODIFIED MERLE D'AUBIGNÉ AND POSTEL METHOD

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ABSTRACT

Objective: To assess the inter-evaluator reproducibility of the Modified Merle d'Aubigné and Postel Method. Method: Forty-five patients took part in the study, with a mean age of 57.93 (±13.35) who underwent total hip arthroplasty. All were evaluated by three researchers, who received training to standardize their criteria. The evaluation was held by the Modified Merle d'Aubigné and Postel Method (association of prefixes A, B and C) the same day at random, and the researchers did not report to one another throughout the evaluations. For mobility assessment, passive hip movements were performed and measured with the universal goniometer. The statistical analysis was carried out by the Cronbach Test ($p \leq 0.05$ and $0.7 \leq \alpha < 1.0$). Results: The statistical analysis showed significantly high inter-evaluators reliability for the items: prefix ($p < 0.001$; $\alpha = 0.961$), pain ($p < 0.001$; $\alpha = 0.892$), gait ($p < 0.001$; $\alpha = 0.898$), mobility ($p < 0.001$; $\alpha = 0.810$) and total score ($p < 0.001$; $\alpha = 0.917$). Conclusion: There was high significance and reliability among the three evaluators for all items of the Modified Merle d'Aubigné and Postel Method, suggesting that this method is reliable, provided its items are parameterized and previous training of evaluators is carried out. ***Level of Evidence II, Diagnostic Study.***

Keywords: Arthroplasty, replacement, hip. Reproducibility of results. Follow-up Studies.

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INTRODUCTION

The hip is considered a weight-bearing joint that besides stability, presents a considerable range of motion. When affected by degenerative processes it has mechanical, metabolic or mixed alterations as a triggering factor.[1]

Functional disorders of the hip, due to their high incidence and difficult resolution, have always constituted a challenge and motivation to the professionals who care for this joint.[2]

For this reason, several evaluation protocols are used to analyze hip function. Among them there is the use of questionnaires, which ask the patient about his or her limitations and disabilities.[3-5] In hip function evaluation instruments, the Harris Hip Score and the Merle d'Aubigné and Postel Method merit special emphasis.[6,7]

Developed in 1954, this evaluation instrument took pain, gait and mobility into account.[8] Charnley[9] modified it in 1972 as a means of categorizing patients, adding the prefixes A, B and C derived from the clinical and radiographic diagnosis. In an attempt to reduce external interference on the evaluated hip, with the prefixing, this instrument was then called the Modified Merle d'Aubigné and Postel Method.[9]

The Modified Merle d'Aubigné and Postel Method instrument is used by various authors in the pre- and postoperative clinical evaluation, since it is considered easily understandable and offers simple application.[10-17] According to Gonçalves,[2] the parameters established in the method modified by d'Aubigné and Postel[7] are considered the most practical in the examination of the hip affected by disease. The associated record of pain, gait and mobility in the pre- and postoperative periods gauges the treatment results. It is emphasized that incomplete records induce errors in the final evaluation, as the result is dependent on the comparative study. The continuous use and the acquired experience of this instrument have increased satisfaction in its applicability in study protocols.[9]

It can be seen that in various scientific studies the analysis is based on the review of medical records, and in these the clinical evaluation described is not always completed by the same examiner. Therefore, it is necessary for the evaluation

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method to be reliable and reproducible over time, to ensure correct patient follow-up.

Keeping in mind the shortage of published national studies explaining the use of the Modified Merle d'Aubigné and Postel Method, and as this instrument is widely used at the scientific level as a means of evaluation,[10-17] the evaluators became interested in ascertaining the reliability of this method. The objective of the study was to analyze the reliability of the Modified Merle d'Aubigné and Postel Method, when carried out by different evaluators.

MATERIALS AND METHODS

The organizers contacted 96 patients monitored by the Hip Group of Santa Casa de Misericórdia de São Paulo. Forty-five patients of both sexes, residing in Greater São Paulo, and submitted to uni- or bilateral Total Hip Arthroplasty (THA), were included in the study. The patients submitted to bilateral THA had only the side with longer follow-up time evaluated. Patients with less than 6 months of THA postoperative (PO) time were excluded. Of the 96 patients, 46 were not willing to take part in the study, and five had less than six months of PO time.

All the patients received explanations regarding the goals and procedures of this survey and in agreeing to take part in the study signed a consent form. The project of this study was approved by the Institutional Review Board under no. 495/07.

The patients were evaluated by the Modified Merle d'Aubigné and Postel Method[9] (Appendix 1), which evaluates pain, gait and mobility, on a scale of 1 to 6 for each item, where 1 indicates the worst and 6, the best state of the patient. The total minimum score reached is 3, and the maximum is 18. In this modified method, the patients are categorized by the alphabetical prefixes: Prefix A: patient with one hip involved; B: patient with two hips involved; C: patient with systemic disease that interferes in normal gait (polyarthritis in rheumatoid arthritis, senility, hemiplegia, cardiovascular and pulmonary dysfunction), which are classified according to the clinical and radiographic diagnosis.

The study used parameters to standardize the gait options. Option 6: indicated patient with normal gait; 5: limping gait without use of crutches; 4: patient who walks long distances with cane (parameterized as the individual who walks in the park without difficulties); 3: limited with cane, tolerates prolonged orthostatism (patient goes to the supermarket, manages to accomplish activities of daily living (ADL); 2: limited in time and distance, with or without cane (patient who goes for a quick walk and returns, covering no more than two blocks); 1: few meters or bedridden, uses cane or crutches (goes to the bathroom and returns, ambulatory in the home).

Passive movements of the hip were made and measured using the universal goniometer to evaluate mobility or range of motion (ROM). The supine position was chosen for the measurement using Lea and Gerhardt as a reference.[18] Hip flexion and extension were tested with the hip at 0º of abduction, adduction and rotation. In flexion the pelvis was stabilized to prevent rotation and posterior tilt. Extension was measured with lower limbs in the Thomas test position, measuring the angle between the femur and the stretcher of the extended limb. Abduction and adduction were tested with the hip at 0º of flexion, extension and rotation. To measure the adduction, the contralateral hip was flexed to allow the evaluation throughout the ROM. For internal and external rotation the hip was positioned at 0º of abduction, adduction with the knee and hip flexed at 90º.

With the purpose of establishing parameters for the evaluation criteria, the three physiotherapist researchers received training in the instrument, carried out according to the evaluation of the Hip Group of Santa Casa de Misericórdia de São Paulo.

The evaluation occurred on the same day, and the patient evaluation order was determined at random. The researchers did not communicate during the evaluation periods. Each patient was evaluated by the three researchers, with an interval of 30 minutes between each evaluator.

Cronbach's Alpha Statistic Test was applied for the statistical analysis through version 13.0 of the SPSS (Statistical Package for Social Sciences) program. A significance level of $p \leq 0.05$ and high reliability with α between 0.7 and 1.0 were considered.

RESULTS

The average age of the 45 patients was 57.9 ($\pm$13.3) years, with 60% of the female sex and 40% of the male sex. The mean evolution time of the THA of the patients evaluated was 63.8 ($\pm$37.0) months, with 23 (51.1%) on the left, and 22 (48.9%) on the right.

The results demonstrated high reliability between the 3 evaluators for all the items of the Modified Merle d'Aubigné and Postel Method, suggesting a significant statistical similarity between them.

In the item pain, Evaluator 1 affirms that 80% of the patients were classified as 6, Evaluator 2 65%, and Evaluator 3 63% in this option. The results for pain were statistically significant with $p<0.001$ (Table 1), presenting high reliability ($\alpha=0.892$) between the three researchers.

For the item gait, Evaluator 1 classified 60% of the patients as 6, Evaluator 2 55%, and Evaluator 3 51%. The data analysis demonstrated high reliability ($\alpha=0.898$) and high significance with $p<0.001$ in the inter-evaluator evaluation. (Table 1)

In the item mobility, Evaluator 1 classified 55% of the patients as 6, Evaluator 2 obtained 73%, and Evaluator 3 evaluated 40% in the same option and 44% of the patients as 5. The result of the three evaluators also presented high reliability ($\alpha=0.810$), for the item mobility, with high significance ($p<0.001$). (Table 1)

In the evaluation of the prefixes

Evaluator 1: Prefix A: 56%. Prefix B: 38%. Prefix C: 6%.
Evaluator 2: Prefix A: 58%. Prefix B: 31%. Prefix C: 11%.
Evaluator 3: Prefix A: 53%. Prefix B: 40%. Prefix C: 7%.

In the statistical analysis of the prefixes, Cronbach's Test indicated high reliability ($\alpha=0.961$) in the inter-evaluator evaluation, with statistically significant results $p<0.001$. (Table 1)

Table 1. *Result by Cronbach's Alpha Statistic Test.*

Evaluation Item	Cronbach Alpha Coefficient (α)	Significance (p)
Prefixes (A, B, C)	0.961	< 0.001
Pain	0.892	< 0.001
Gait	0.898	< 0.001
Mobility	0.810	< 0.001
Total Score	0.917	< 0.001

In the total score the statistical data presented high inter-evaluator reliability (α=0.917) and high significance with $p<0.001$. (Table 1) The values of the percentages were approximate.
Table 2 presents the results found for each item of the Modified Merle d'Aubigné and Postel Method by each evaluator.

DISCUSSION

Total arthroplasty is a surgical procedure widely used in the treatment of degenerative disorders of the hip joint, where it is necessary to have sensitive protocols for the evaluation of these patients, in order to improve the quality of the research and clinical applicability.
Although it is widely used in orthopedic clinical practice to quantify pre- and post-THA patient evolution, we did not find any studies that would verify the reliability of the Modified Merle d'Aubigné and Postel Method. Hence we felt the need to evaluate the inter-evaluator results of the reliability of this instrument.
In the study, the analysis of the reliability of the Modified Merle d'Aubigné and Postel Method showed high inter-evaluator correlation for all the items: prefixes, pain, gait, mobility and total score ($p<0.001$). Reliability was expected in the inter-evaluator comparison in relation to the classification of the patients in prefixes A, B or C, as it is based on the clinical and radiographic diagnosis, which was confirmed with α=0.961. Nevertheless, we stress the importance of this correct classification, seeing as the gait evaluation may be compromised without correlation with the evaluated hip.
As pain is subjective it has peculiar evaluation and can be frequently evaluated in an incomplete or inadequate manner.[19,20] It is important to define the pain that originates in the evaluated hip, since patients often report pain originating in another region.
During the evaluation it was verified that the patients presented pain with different intensity and characteristics. Some reported pain after minimal effort; while in others, this pain manifested itself in activities involving considerable effort.
Jensen et al.[21] report that due to the variety of painful experiences, reliable measurements can only be established with difficulty. Some authors suggest that the classification of pain intensity obtained at different times is more trustworthy.[21-23]
However, as the objective of this study was not to evaluate the treatment results, but rather to verify inter-evaluator reliability, we adopted pain evaluation on the same day.
When the patients were classified according to the instrument's proposal, it was noticed that in spite of having different pain characteristics, these were classified in a similar manner, and the item pain presented high reliability (α=0.892).
The satisfactory results for pain, encountered in the study, can be explained by the fact that we used the standardized evaluation instrument, which helped in the choice of the option by the patients. Agreeing with the studies of Duncan et al.[20]
In this study it was verified that a significant portion of patients did not use canes or crutches even though they presented some degree of limitation. High inter-evaluator reliability of proven gait was demonstrated with α=0.898.
Another factor to be considered is the distance covered, since as this instrument uses subjective terms to qualify it, the evaluators may assign different scores for the gait of the same patient. As the distance covered was parameterized previously

Table 2. *Results of the Modified Merle d'Aubigné and Postel Method by evaluator of the patients.*

	Prefix			Pain			Gait			Mobility			Total		
Patients	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1	B	B	B	1	1	2	5	2	2	4	4	4	10	7	8
2	A	A	A	6	6	6	6	6	6	6	6	5	18	18	17
3	A	A	A	6	6	6	6	6	6	6	6	5	18	18	17
4	A	A	A	6	2	3	3	2	2	5	6	5	14	10	10
5	B	B	B	6	6	6	6	6	6	5	6	5	17	18	17
6	A	A	A	6	6	6	6	6	6	5	6	5	17	18	17
7	B	C	B	6	6	6	6	6	6	5	6	5	17	18	17
8	A	A	A	6	6	6	6	6	6	6	6	6	18	18	18
9	A	A	A	6	4	6	3	3	2	6	6	5	15	13	17
10	A	A	A	6	6	6	6	4	4	6	6	5	18	14	18
11	A	A	A	6	6	6	6	6	6	5	6	5	17	18	17
12	A	A	A	6	6	4	6	6	5	5	6	4	17	18	13
13	B	B	B	4	4	4	6	6	6	6	6	6	17	16	16
14	C	C	C	4	4	4	5	5	5	4	5	4	13	14	13
15	A	A	A	6	6	6	6	6	6	5	5	5	17	17	17
16	A	A	A	6	6	6	6	6	6	6	6	6	18	18	18
17	A	A	A	6	6	6	6	6	6	5	6	5	17	18	17
18	A	A	A	6	6	6	5	6	6	6	6	6	17	18	18
19	A	A	A	6	6	5	6	6	5	5	5	5	17	17	15
20	B	A	B	6	6	6	6	2	5	6	6	6	18	14	17
21	C	C	C	6	6	6	6	5	5	6	6	6	18	17	17
22	A	A	A	6	6	6	6	6	6	6	6	6	18	18	18
23	A	A	A	6	4	4	6	6	6	6	6	6	18	16	16
24	B	B	B	6	6	4	6	6	5	6	6	6	18	18	15
25	A	A	A	6	6	6	3	2	6	6	6	6	15	14	18
26	A	A	A	5	3	1	3	2	5	5	5	5	13	10	11
27	A	A	A	3	4	4	5	2	5	6	6	6	15	12	15
28	B	B	B	6	6	6	6	6	6	6	6	5	18	18	17
29	B	B	B	6	5	6	3	4	2	5	6	5	17	15	13
30	A	A	A	6	4	4	6	6	6	6	6	6	18	16	16
31	A	A	A	6	6	6	2	4	4	5	4	4	13	14	14
32	C	C	C	6	6	6	2	2	1	5	6	4	13	14	11
33	B	B	B	6	4	4	5	5	6	4	5	4	15	14	14
34	A	A	A	6	6	6	6	6	6	5	6	6	17	18	18
35	A	A	A	6	6	6	6	6	5	6	6	5	18	18	16
36	B	B	B	4	4	3	6	6	6	6	6	5	16	16	14
37	A	A	A	4	4	3	6	6	6	6	6	6	16	16	16
38	B	B	B	6	6	6	5	5	5	6	5	6	17	16	17
39	B	A	B	6	4	3	5	5	5	5	5	6	16	14	14
40	B	B	B	6	6	6	6	6	6	6	6	6	18	18	18
41	B	B	B	6	6	6	5	2	5	5	5	5	16	13	16
42	B	B	B	6	6	6	6	6	6	6	6	6	18	18	18
43	B	B	B	6	6	6	1	1	1	5	4	4	12	11	11
44	A	C	B	4	4	4	5	4	5	6	5	5	15	13	14
45	B	B	B	4	3	3	3	2	3	6	6	5	13	11	11

1 - evaluator 1; 2 - evaluator 2; 3 - evaluator 3.

between the evaluators, this item presented high correlation (α=0.898). When the patient did not use the walking aid, the evaluators considered the degree of limitation when assigning a score to the item.

The mobility evaluation was performed using passive movements and measured with the universal goniometer. The literature shows that in clinical practice this ROM evaluation instrument is the most reliable, fast and inexpensive, showing greater precision in the measurements.[24] All the ROMs of the hips evaluated were gauged in the supine position. According to Lea and Gerhardt,[18] the supine position is the best for accessing the active and passive ROM of the hip, in all the planes (flexion, extension, adduction, abduction, external and internal rotation), while the rotational movements of the hip are best measured with the hip in flexion.

Although literary evidence suggests that passive movement evaluation is harder to measure than in active movement,[24] the participants opted to use passive movement, as this does not depend on the patient's muscle strength, and also helps to show slight disorders in joint mobility.[25] Moreover, our patients underwent a surgical procedure (THA), and are therefore expected to present some degree of reduction of muscle strength, which may interfere in the active movement evaluation.

It should also be remembered that pain can be a limiting factor for the ROM, and when present, will appear in the same degree, regardless of the evaluator.

Several authors present differences of opinion with regard to the inter-evaluator reliability. O'Doherty (1997) apud Pynsent[26] showed very low reliability in their studies in the inter-evaluator and intra-evaluator evaluations in the ROM measurements. Rothstein et al.[27] found low inter-evaluator reliability when the patient was evaluated in different positions in knee movement measurements. On the other hand, Riddle and collaborators[28] reported greater inter-evaluator reliability when they performed passive movement of the shoulder, with the patient remaining in the same position.

Studies report that reliability can be influenced by the examiner's experience[29] and generated from the standardization of the measurements in the methodology, since the parameter is essential to control sources of errors; hence it is possible to generate reliable measurements, cited by Miller.[30] Due to the standardizations of measurements, the study presented high reliability with α=0.810 in the evaluation of the ROM.

When considering the validity of an evaluation instrument it is essential to have reliability, i.e., agreement between the evaluators with regards to the result obtained. The literature reports that in clinical practice, reliability measurements can improve test efficiency.[29]

The aim of this study was to evaluate the reliability of the Modified Merle d'Aubigné and Postel Method in patients after hip arthroplasty using the analysis of the degree of inter-evaluator reliability, thus verifying its reproducibility in clinical practice by different professionals.

CONCLUSION

The Modified Merle d'Aubigné and Postel Method exhibits high inter-evaluator reliability when its items are parameterized and previous training is held, indicating its reproducibility in clinical practice.

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Appendix 1 – *Evaluation Protocol.*

Modified Merle d'Aubigné and Postel Method			
PREFIXES	( ) A: Patient with 1 hip involved	GAIT	(6) Normal
			(5) Limps, without crutches
	( ) B: Patient with 2 hips involved		(4) Walks long distance with cane
			(3) Limited with cane, tolerates prolonged orthostatism
	( ) C: Patient with some factor contributing to failure to achieve normal gait		(2) Limited in time and distance with or without cane
			(1) Few meters or bedridden; uses cane or crutches
PAIN	(6) No pain	MOBILITY*	(6) 211º - 260º
	(5) Pain when starting deambulation, decreasing with activity		(5) 161º - 210º
	(4) Pain after activities, disappearing with rest		(4) 101º - 160º
	(3) Tolerable pain with limited activity		(3) 61º - 100º
	(2) Intense pain during ambulation		(2) 31º - 60º
	(1) Intense and spontaneous pain		(1) 0º - 30º
TOTAL SCORE			
Range of Motion			
Flexion (10º) (0º)		Extension (0º) (10º) (20º) (30º) (40º) (50º) (60º) (70º) (80º) (90º) (100º) (110º) (120º) (130º)(>130º)	
Abduction (>60º) (60º) (50º) (40º) (30º) (20º) (10º) (0º)		Adduction (0º) (10º) (20º) (30º) (40º) (>40º)	
External Rotation (>50º) (50º) (40º) (30º)(20º) (10º) (0º)		Internal Rotation (0º) (10º) (20º) (30º) (40º) (50º) (>50º)	

*Mobility = Sum of the range of motion of flexion, extension, abduction, adduction, internal rotation and external rotation.