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COMPARISON OF CLINICAL GAIT ANALYSIS STRATEGIES BY FRENCH NEUROLOGISTS, PHYSIATRISTS AND PHYSIOTHERAPISTS

Eric Watelain,[1,3,6] Jérôme Froger,[1,4] Franck Barbier,[3,6] Ghislaine Lensel,[2] Marc Rousseaux,[1,4] François-Xavier Lepoutre[3] and André Thevenon[1,5]

From the [1]Laboratoire d'Analyse du Mouvement, Centre Hospitalier Régional Universitaire (CHRU) de Lille, Service d'Exploration Neurophysiologique, Hôpital B, Lille, [2]Laboratoire d'Etudes de la Motricité Humaine, Faculté des Sciences du Sport et de l'Education Physique, Université de Lille 2, Ronchin, [3]Laboratoire d'Automatique et de Mécanique Industrielles et Humaines, Université de Valenciennes et du Hainaut-Cambrésis, Valenciennes, [4]CHRU de Lille, Hôpital Swynghedauw, Service de Rééducation et de Convalescence Neurologique, [5]Service de Médecine Physique et de Réadaptation, Lille and [6]Facultés des Sciences et des Métiers du Sport, Université de Valenciennes et du Hainaut-Cambrésis, Valenciennes, France

Clinical and functional gait analysis is used widely by different professionals dealing with patients with hemiplegia. The aim of this study was to examine the gait analysis strategies of neurologists, specialists in physical and rehabilitation medicine (physiatrists) and physiotherapists. Differences in global analysis strategy and choice of indicators between different clinicians have not previously been studied precisely, and we believe that a standardized approach would enhance the training of young practitioners. The knowledge acquisition phase (specialists' expertise identification) was completed by an identified expert with a subject groups of 5 neurologists, 5 specialists in physical and rehabilitation medicine and 5 physiotherapists, who were asked to comment on a videotape of patients with hemiplegia walking, followed by a semi-directed interview. The results show that specialists use a wide variety of gait indicators. The total number of different medical vocabulary and expressions used to describe gait was 396, semantically grouped as 60 general indicators. Specialists highlighted an analysis strategy (order, type and number of indicators) typical to each professional specialty. The neurologists tried to identify the elements allowing localization of lesions and characterized the hemiplegia globally, while the specialists in physical and rehabilitation medicine conducted a biomechanical analysis and the physiotherapists were highly descriptive. The differences in strategies adopted by each specialty contribute to an enrichment of gait analysis. This should be taken into account in teaching and determining gait assessment scales.

Key words: functional gait assessment, gait analysis, hemiplegia, knowledge sampling.

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Correspondence address: Pr André Thevenon, CHRU de Lille, Hôpital Swynghedauw, Service de Médecine Physique et de Réadaptation, FR-59037 Lille cedex, France. E-mail: athevenon@chru-lille.fr

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INTRODUCTION

The restoration of a more efficient and more aesthetic gait is a basic priority for most patients with hemiplegia and their therapists (1–3). Gait analysis strategy has thus become an essential part of patient assessment (4). During their numerous consultations in hospitals or clinics, patients with hemiplegia may come into contact with a variety of medical or non-medical therapists from different specialties, which assess gait according to their specific objectives. The strategies used for clinical gait analysis have not yet been examined precisely (e.g. differences between specialists, strategies, variety of gait indicators) in the medical literature. However, clinical gait analysis is used systematically by these professionals and the variability of their visual observations has already been described (4–9). To help professionals and reduce variability in this difficult task, some gait charts have been proposed, for example those of Perry (10), Hughes & Bell (11) and Lord et al. (9). A more complete knowledge of the preferred clinical gait analysis strategies would help to improve not only treatment, but also the training of young practitioners.

Our initial hypothesis was that visual gait evaluation could be associated with different strategies depending on the professional specialty. The aim of the study was to identify and compare the gait analysis strategies used by neurologists, physicians in rehabilitation medicine and physiotherapists with similar levels of experience.

SUBJECTS AND METHOD

Specialists

We studied the clinical gait analysis strategies of 5 neurologists, 5 specialists in physical and rehabilitation medicine (physiatrists) and 5 physiotherapists at their places of work. All 15 of these professionals were particularly involved in the rehabilitation of patients with hemiplegia. These specialists were chosen because of their regional reputation for competence in the treatment of patients with hemiplegia. They all manage clinical staff and practice in "Nord-Pas de Calais-Picardie" (France) regional hospitals. All the professionals contacted agreed to take an active part in the study. Their age range was 39–62 years and they had a mean experience of 23.6 years (11–38 years) in the treatment of patients with hemiplegia. All specialists were senior teachers in their specialty in regional institutes and thus could be considered experts in their field.

Patients with hemiplegia

The patient group comprised 6 male patients with hemiplegia, aged 37–58 years, who had suffered a cerebrovascular accident at least 6 months

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before (6 months to 2 years). The patients presented varied levels of autonomy and recovery. Each had recovered the ability to walk independently (only 1 patient used a walking stick, none of the others used any form of assistance). The ambulation perimeter was between 20 and 400 meters. One patient (case 6) was overweight and had a discrete valgus of both knees. The others presented no identified associated disorder that could affect the study protocol. The protocol was reviewed and approved by the local Institutional Review Ethics Board. After being informed of the study protocol and prior to filming, each patient signed an informed consent form and accepted the entire protocol, which is totally anonymous.

Data recordings

Knowledge acquisition was performed by a specialist in knowledge acquisition using a protocol analysis method, which encouraged the specialists to "think aloud" prior to a semi-directed interview (12).

Patients were filmed face on, from behind and in profile (right and left) using a 50 Hz VHS videotape. Records were presented individually to each specialist. Patients were always presented in the same order. The specialists were allowed to look at all or any part of the film as often as they wanted. They were asked to make a detailed functional gait analysis of each patient. The number of times the specialists referred to earlier segments of the tape as well as the length of the segments were quantified. The investigator's propositions and expressions were limited as much as possible (12).

Following the recommendations of Carr (13) the interviews employed mostly open-ended questions (14) concerning the identification of the professional's clinical gait analysis strategies in order to gather as much information as possible, and which allowed us to use the bottom-up method (12, 15). The responses were then compared with the clinical gait analysis strategies identified during video analysis.

All of these analyses and interviews were tape-recorded for detailed study at a later date.

Data analysis

Data analysis consisted of transcribing the verbal functional gait analysis as well as the interviews. Each item of the functional gait analysis information was classified, specialist by specialist and patient by patient, and then regrouped to obtain a smaller number of more global indicators. The overall list of indicators was culled from the indicators mentioned (presence or absence) by each specialist, regardless of whether the indicator was mentioned once or several times. The result was counted as 1 or 0 for each indicator, each patient and each specialist (i.e. "foot drop" or "no foot drop", is counted as 1, even if it was mentioned several times for the same patient). Afterwards, the indicators identified were separated into 5 categories: (A) "localized" indicators (1 limb segment, 1 joint or 1 gait event); (B) "regional" indicators (1 limb or upper body); (C) "step parameter" indicators (temporal and stride characteristics); (D) "overall" indicators (general descriptions of patient behaviour); (E) "interpretive" indicators (mechanisms that underlie disorders). Secondly, the authors in collaboration with a knowledge acquisition specialist compared clinical gait analysis strategies.

Statistical analysis

For global statistical analysis, each of the 15 specialists was defined according to the description indicators he or she used for gait analysis of the 6 patients. The hierarchical cluster method proposed by Ward is largely used in the medical literature (16–19). It assigns the specialists to clusters (families) in a step-wise fashion. It begins with as many clusters as there are specialists, i.e. 15 in this study. Afterwards, these individual clusters are joined together to form new clusters and so on. The procedure ends by grouping all data sets in a single cluster, which forms a hierarchical tree called a dendrogram. The data sets are first joined into clusters according to the degree of similarity of the frequency of use (0–6) of all gait indicators for each specialist (15). Though there are other methods available, we based our determination of similarity on the Euclidean distance between the data sets, which is the most commonly chosen (16–19) type of distance calculation. In Fig. 1 the dendogram shows specialists grouped in pairs at different linkage distances. The optimum number of clusters was determined using the R ratio (17, 19), a measurement of the reduction of the inner cluster variability.

Simple ANOVAs, followed by a *post hoc* Tukey (HSD) for pairwise comparison testing, were used in this study. In statistical terms, each gait evaluation was considered individually, i.e. the 5 specialists in each domain multiplied by 6 evaluations to form the group analysed. For a given professional specialty, each of the 5 indicator categories used (A–E) were compared to identify the indicator categories preferred by each profession. For a given indicator category, each professional specialty (neurologist, physiatrist and physiotherapist) was also compared to determine which profession used which indicator category the most. A variance analysis with repeated measurements was used to determine the regularity of the indicator number used by all professional specialties for patients 1–6. A simple *t*-test was used to compare the number of indicators used in each specialty. The statistically significant differences found ($p < 0.01$) were used to describe the type of information used between and within each professional specialty and $p < 0.05$ with the Bonferroni adjustment for multiple tests was performed to compare pairwise data sets.

RESULTS

Context

In most specialists, there were similarities between the gait analysis strategies observed in film studies and the strategies identified during the interview (main objective, more important indicators, sequences of analysis strategy, time allocated). Because the aim of this study was not to compare the efficiency of each profession, the following temporal parameters were not compared. The average time spent on each patient was 10 minutes (±2 minutes 12 seconds; 4–15). The average number of times the specialist referred back to a particular sequences was 3.4 (±0.9; 0–6). The total number of different locutions (medical terms) used to describe gait was 396. This high number can be explained by the use of periphrases and synonyms.

Description and analysis of indicators

For the above large semantic grouping, 60 general indicators were identified. Forty-five of them were cited more than 5 times (i.e. on average, at least once per patient: Table I) and 15 others 5

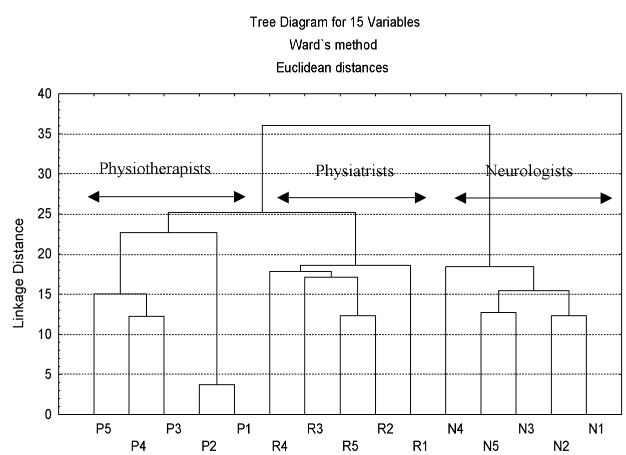

Fig. 1. Dendrogram of the ascendant hierarchical classification of a Ward cluster analysis. On the x axis, P1–P5 corresponds to the 5 physiotherapists, R1–R5 the specialists in physical and rehabilitation medicine (physiatrists) and N1–N5 the neurologists. On the y axis the Euclidean linkage distances of clustering are represented.

times or less (Table II). After categorization of the indicators used, the most extensive list was "localized" (13: Table IA). "Regional" descriptive analysis (Table IB) grouped 7 indicators. Analysis of "step" characteristics (Table IC) and "general" gait analysis (Table ID) grouped 10 indicators each. The last 5 indicators were "interpretative" (Table IE).

An overall analysis of the gait indicators used by each specialist was made using an ascendant hierarchical method of classification. The dendogram of the Ward cluster analysis (16, 17, 19) is shown in Fig. 1. The optimum number of clusters for this study was 3, within which the 5 specialists of each professional specialty were grouped. The physiotherapists and specialists in physical and rehabilitation medicine clusters were grouped together before being grouped with neurologists, which suggests a higher incidence of similarity between the analyses of physiotherapists and specialists in physical and rehabilitation

Table I. *Gait indicators cited more than 5 times. They are grouped into 5 categories: (A) "localized" indicators; (B) "regional" indicators; (C) "step" parameter indicators; (D) "overall" indicators; (E) "interpretive" indicators. For each indicator, we give the number of specialists who used it; the number of times it was cited; and the number of patients for whom it was used*

Categories	Indicators	Number of specialists	Number of citations	Number of patients
A	Flexion/extension, ankle/knee/hip	15	69	6
	Varus/valgus, ankle/knee/hip	15	44	5
	Stability, ankle/knee/hip	13	34	6
	Equinus	13	30	5
	Initial contact, foot progression	14	48	6
	Flessum/recurvatum of knee	15	48	6
	Control of ankle/knee/hip, including locking of knee	11	27	6
	Rotation hip/pelvis	13	30	6
	Pelvic hike to allow clearance	10	19	6
	Quality of pelvic step	4	7	5
	Symmetry of shoulders	12	25	6
	Mobility of shoulder blade	4	7	3
	Hand mobility	9	26	6
B	Circumduction	15	59	6
	Steppage	5	16	6
	Flexion/extension quality of lower limb	12	42	6
	Swing, mobility, good functioning of arms	14	45	6
	Posture of superior member	15	82	6
	Swaggering or saluting	11	20	4
	Lateral bending, rotation, retroposition of trunk, etc.	12	27	6
C	Step duration, rhythm	8	19	6
	Step width, angle	15	30	6
	Step length, symmetry/asymmetry	15	58	6
	Quality of support	14	51	6
	Quality of push-off	7	15	6
	Quality of swing phase	12	28	6
	Limb trajectory	10	29	6
	Leg thrown forwards or dragged	12	30	6
	Leg drooped, stamping of foot	9	17	6
	Quality of double support, loading response	9	19	5
D	Synkinesis	5	16	6
	General posture, symmetry	10	25	6
	Balance	13	29	6
	General synchronism, dissociation of planes	10	19	6
	Walking speed	12	23	6
	Half-turn, standing up from chair	8	21	6
	Parameters modified by repetition (circumduction, spasticity, etc.)	8	17	6
	Lack of fluidity, jolting, etc.	9	17	4
	Looks at his feet, care taken when walking	6	8	4
	Particularly localized defect (proximal, distal, brachio-facial, etc.)	12	34	6
E	Motor deficiency	10	26	6
	Efficiency of a particular muscle	12	27	6
	Hyper or hypotonia/spasticity	15	63	6
	Sensibility disorder	10	28	5
	Possible other afflictions	5	9	5

Table II. *Little-used indicators (5 times or less by all specialists in 90 gait evaluations). For each indicator, we give the number of specialists who used it; the number of times it was cited; and the number of patients for whom it was used*

Little-used indicators	Number of specialists	Number of citations	Number of patients
Harmony, period of the swing phase	5	5	5
Use of assistance devices	5	5	2
Claudication or limping	3	4	3
Abduction of arm for rebalancing	3	4	3
Risk of falling	3	4	2
Use of leg as walking stick	3	4	2
Sensation of pain when walking	3	3	2
Head mobility	2	5	4
Long-standing hemiplegia	2	3	2
Appearance of extension synergies	2	3	1
Phobia of walking	2	2	1
Trembling	1	1	1
The patient could do better	1	1	1
The patient is intentionally walking slowly	1	1	1
Improvement of distal movement would improve proximal	1	1	1

Table IV. *Indicator categories used within professional specialties. The mean (standard deviation) is shown for each of the 5 categories*

	Neurologists	Physiatrists	Physiotherapists
"Localized" indicators (A)	4.3 (2.4)	7.8 (2.7)$^{\#}$	6.7 (2)$^{\#}$
"Regional" indicators (B)	3.7 (1.4)	4.1 (1.7)	2.9 (0.9)
"Step" indicators (C)	7.8 (2.3)*	10.9 (3.2)*	4.5 (1.8)
"General" indicators (D)	2.3 (1.2)$^{\times}$	5 (2.1)	4.1 (2)
"Interpretative" indicators (E)	3.6 (1.6)	3.3 (1.7)	1.5 (1.3)
p between indicator categories	$p < 0.01$	$p < 0.001$	$p < 0.001$

$p < 0.01$ between C and all others = *, A with all others = $^{\#}$, E with A, C and E = , D and all others = $^{\times}$, E and D = $^{\oplus}$

medicine, than between those of physiotherapists and neurologists, or specialists in physical and rehabilitation medicine and neurologists.

On the basis of the 3 groups identified by cluster analysis, comparisons were performed in order to link the use of these indicators by each professional specialty. We first evaluated the average use of each indicator category (A–E) in each of the 3 groups of specialists (Table III). Differences between groups were observed for each category of indicators. They were more important for "step" indicators. "Interpretative" indicators were used twice as often by neurologists or specialists in physical and rehabilitation medicine than by physiotherapists.

For a given professional specialty, the number of indicators used in the 5 categories was later compared (Table IV). Differences were observed for most of the indicator categories used by each professional specialty. The most important and significant differences were that neurologists use more "step" indicators than all other categories (7.8 ± 2.3 "step" indicators per gait evaluation vs 2.3 ± 1.2 to 4.3 ± 2.4 for others categories) and less "general" indicators (2.3 ± 1.2 vs 3.6 ± 1.6 to 7.8 ± 2.3), specialists in physical and rehabilitation medicine use more "localized" and "step" indicators (respectively 7.8 ± 2.7 and 10.9 ± 3.2 vs 3.3 ± 1.7 to 5 ± 2.1), and physiotherapists use more "localized" indicators (6.7 ± 2 vs 1.5 ± 1.3 to 4.5 ± 1.8).

The use frequencies of all the indicators in each category by each professional specialty are presented in Table V. For example, for the 30 physiotherapists' gait evaluations (5 physiotherapists with 6 evaluations), 11 included all the localized indicators, i.e. 37%. The use frequency of all indicators in the same category is relatively low, suggesting irregular use of these indicators (always lower than 47%).

The specialists in physical and rehabilitation medicine used significantly more indicators than did neurologists and physiotherapists for all patients; no difference was found between the last 2 professional specialties. For the 3 professional specialties, considered together, the mean number of indicators used was 23.5 ± 8.4 indicators. The overall number of indicators used by specialty from patient 1 to 5 was relatively constant as shown in Fig. 2B, but masked a more important variability for

Table III. *Indicator categories used between professional specialties. The mean (standard deviation) is shown for each of the 5 categories. For example, neurologists utilize on average, 4.3 (2.4) "localized" indicators for the 36 gait evaluations*

	Neurologists	Physiatrists	Physiotherapists	p between groups
"Localized" indicators (A)	4.3 (2.4)*$^{+}$	7.8 (2.7)*	6.7 (2)$^{+}$	<0.01
"Regional" indicators (B)	3.7 (1.4)	4.1 (1.7)#	2.9 (0.9)#	<0.01
"Step" indicators (C)	7.8 (2.3)*$^{+}$	10.9 (3.2)*#	4.5 (1.8)$^{+}$#	<0.001
"General" indicators (D)	2.3 (1.2)*$^{+}$	5 (2.1)*	4.1 (2)$^{+}$	<0.01
"Interpretative" indicators (E)	3.6 (1.6)$^{+}$	3.3 (1.7)#	1.5 (1.3)$^{+}$#	<0.01

$p < 0.01$ between neurologists and specialists in physical and rehabilitation medicine = *, neurologists and physiotherapists = $^{+}$, specialists in physical and rehabilitation medicine (physiatrists) and physiotherapists = #

Table V. *Use frequencies of all indicators in each category, by professional specialty. For example, for the 30 neurologists gait evaluations (5 neurologists with 6 evaluations), 9 included all the localized indicators i.e. 30%*

	Neurologists (%)	Physiatrists (%)	Physiotherapists (%)
"Localized" indicators (A)	30	43	37
"Regional" indicators (B)	47	43	37
"Step" indicators (C)	20	40	17
"General" indicators (D)	27	33	17
"Interpretative" indicators (E)	47	33	27

each specialist, as presented in Fig. 2A. All specialists used a lower number of indicators for case 6, who presented an "unusual" gait disorder (16.5 ± 5.2 for patient 6 vs 24.9 ± 8.3 for patients 1–5), giving a $p < 0.01$ between patient 6 and each of the others.

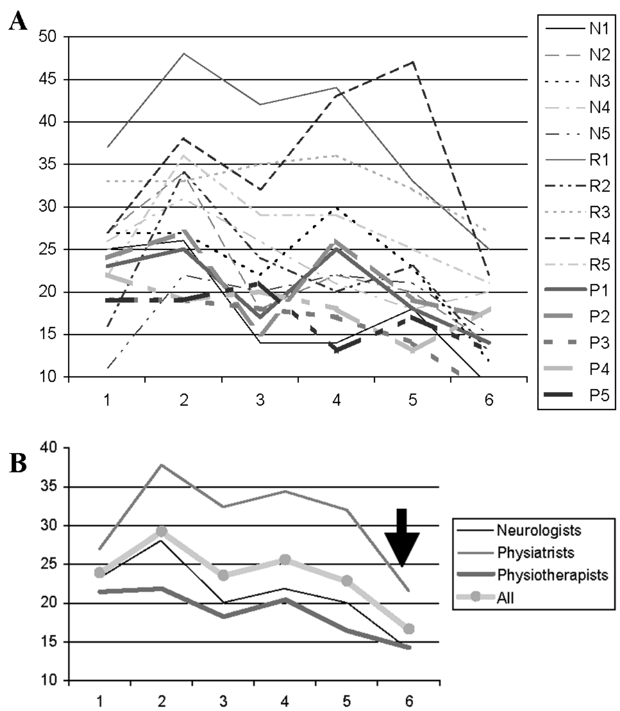

Fig. 2. Number of indicators used for the 6 clinical gait evaluations for patients 1–6, specialist by specialist in A and specialty by specialty in B. P1–P5 corresponds to the 5 physiotherapists, R1–R5 the specialists in physical and rehabilitation medicine (physiatrists) and N1–N5 the neurologists. For example, in A, Physiatrist 1 used 37 indicators for his/her first clinical gait evaluation. N1–N5 represent the neurologists, and are traced with the thinnest line; R1–R5, the physiatrists, are traced with a lines of medium thickness; P1–P5, the 5 physiotherapists, are traced with the thickest line. In B, the averages of all specialists are indicated with circles. Arrow indicates patient 6 presenting an unusual gait disorder.

Gait analysis strategies

Depending on the indicators used, the step of the clinical gait analysis and the principal aim of the evaluation, the analysis strategies were more similar within a given profession than between them. Close examination of the various analytical steps identified in each professional specialty showed that the neurologists and the specialists in physical and rehabilitation medicine began by providing an overall description (such as intersegmental coordination or flexion/extension synergy) with a great predominance of "general" indicators (Table ID), before concentrating on details (predominance of Table IA and B), and finished by providing aetiological, biomechanical or physiological hypotheses (predominance of Table IE). The neurologists tried to classify gait according to various categories (e.g. spastic, ataxic, sensitivity problems). The specialists in physical and rehabilitation medicine tended to dwell on therapeutic indications. The physiotherapists treated the problems individually (such as absence or presence of circumduction, or the progression of the foot). For 12 of the 15 specialists consulted, the gait analysis was very structured and consistent from one patient to another. For all the specialists, we noticed a destructuring or cessation of the usual functional gait analysis strategy in the analysis of one patient (case 6) whose gait was radically different from the "usual" stroke gait characteristics, a patient with excess weight, discrete bilateral valgus of the knee and a relatively fast gait.

DISCUSSION

Methodology and its limitations

It is rare to see studies concerning clinical gait analysis strategies and particularly the comparison between the different specialties. Identifying gait analysis strategies requires a complex and rigorous methodology and the results must be interpreted with caution.

We advised specialists to complete their analyses as they would in their clinical practice. However, gait analysis usually proceeds from an exhaustive clinical examination (20, 21) and has a specific objective (5). The absence in our study, of such detailed clinical information and the lack of specific objectives could have slightly modified the specialists' habitual approach.

We chose to use video recordings for a protocol analysis, despite certain limitations (13), because their use has been shown to improve gait analysis (4) and it guaranteed that the specialists were looking at the same gait patterns.

In the literature, several tools have been proposed for strategy analysis by knowledge elicitation (22). We chose a protocol analysis method, which encouraged the specialists to "think aloud" followed by a semi-directed interview. The protocol analysis allowed knowledge acquisition about the procedural and associative aspects of the application task, while the follow-up interview analysis highlighted the static domain features, such as concepts, structures, attributes and their values (23). Doing the gait analysis prior to the interview also helped specialists to relax by allowing them to begin with a non-threatening, routine task. Furthermore, information gathered during these gait analysis sessions was used later during the interviews.

The average time spent and the number of times each specialist went back over particular details on the video was similar to results described by Krebs et al. (6). The number of indicators used remained relatively constant, with the exception of the sixth patient for whom the number was lower. These results suggest that the specialists participated actively in the study and used comparable cognitive strategies.

The high interrater and within rater variabilities of clinical gait analyses is well documented in the literature (4–7, 13, 21). This variability could be considered a potential limitation of this study, but given that it is part of daily clinical practice and that it could well be equivalent for the 3 professions, it does not particularly affect the results, which allowed a comparison of the clinical gait analysis of 3 professions under the same conditions.

Clinical gait analysis strategies

The large number of locutions used to describe gait indicates a lack of consensus among specialists concerning terminology. The variety of semantically-similar locutions used forced us to group information in order to obtain a smaller, more representative number of indicators. The lack of standardization for parameters of gait observation has already been reported (14). Such a lack could contribute to the difficulty of exchanges between specialists or groups of specialists, and suggests the need for more standardized training in gait analysis (14, 25) and the use of specific clinical gait charts (9–11). Nevertheless, all indicators usually cited in studies of clinical gait analysis (7, 9–11, 14, 20, 21, 23, 25–32) were referred to in our study, apart from “vaulting”.

Cluster analysis of the 60 indicator frequencies, showed 3 distinct strategies for gait analysis. Each of these 3 clusters contains the same professional specialty, which confirms our hypothesis that the assessment was performed differently by each profession. For physiotherapists, similar strategies of clinical gait analysis have been previously reported (14). Our study suggests that the most divergent approaches exist between physiotherapists and neurologists, and the most similar between physiotherapists and specialists in physical and rehabilitation medicine. As far as we know, such differences have never been mentioned in the literature.

Each of the 3 professional specialties used the 5 indicator categories differently. These differences can be explained by divergent objectives in the gait analysis (6, 14). Specialists were asked to make a detailed assessment of patient gait, similar to that done in their clinical practice. We found that the neurologists concentrated on finding the pathophysiological origins of the disorders and associating them with 1 or more lesions in the (central) nervous system. To do so, they used more “interpretative” indicators and fewer “localized” and “general” indicators of the quality of the gait than other professionals (e.g. the quality of the double support or the loading response were never cited). The specialists in physical and rehabilitation medicine, on the other hand, used more “step” indicators, which could be related to their interest in describing patient incapacity. Their analyses were first descriptive, and then biomechanical. They were less interested in causative lesions (e.g. the “possible other afflictions” indicator is cited 10 times by the neurologists and 0 times by the specialists in physical and rehabilitation medicine). Furthermore, specialists in physical and rehabilitation medicine used more indicators than either of the other professions (Fig. 2), which could indicate a better practice of gait analysis and a more wide-ranging approach. The specialists in physical and rehabilitation medicine were in the middle of the dendogram, which suggests a middleman approach falling between that of the neurologists and physiotherapists. The physiotherapists were essentially descriptive, with the least interest in “interpretative”, “step” and “regional” indicators, compared with other professionals. They mostly used “localized” indicators. Their evaluations were essentially focused on disorders, which their professional intervention could improve.

Specialists most often used the indicators that best allowed them to reach the objectives of their own profession. For example, the indicator of hand movement was used 81% of the time by the neurologists (19% by specialists in physical and rehabilitation medicine plus physiotherapists) and each of the 5 neurologists (only 1 physiotherapist and 2 specialists in physical and rehabilitation medicine). On the other hand, the “push-off quality” indicator was used 67% of the time by the specialists in physical and rehabilitation medicine, while it was never cited by the neurologists. This purely functional information was presumably ignored by the neurologists because it did not allow them to determine the neurological origin of the patient’s disorder, which is their main professional objective. The consequences of neglecting certain parameters, which are considered fundamental by another profession raises the importance of collaboration between professions. It would appear that an inter-professional approach (with or without forms) is desirable, prior to focusing on the specific aim of each professional specialty. We suggest that generalizing the use of more global, representative and inter-professional indicators, such as velocity or endurance, would improve inter professional communication.

Patla et al. (14) have observed differences between what clinicians say they do during analysis and what they actually do in practice. The overall data set in our study shows that there was not one approach for free gait analysis systematically applied to each patient, even if the principal stages of analysis were usually reproduced. There are several possible explanations. Some indicators are used only when a patient manifests the disorder; its absence could sometimes be left unnoticed. Other indicators are cited only when they can be used to identify aetiology or to suggest treatment. It can thus be supposed that the different specialists are guided in their choice of indicators by a general impression, as has already been pointed out by Miyasaki & Kubota (33) and/or by their own personal visions of the pathology. The overall descriptions made by neurologists and specialists in physical and rehabilitation medicine at the beginning of gait analysis confirm this supposition. We noticed that general impressions are not the same for the different specialists, which partly explains their diverging choice of indicators. The first impression appears to be important in determining the structure of their analyses. Where the first general impression is unusual (case 6), routine assessment schemas are not cognitively triggered, and as a result, the functional gait analysis is not structured. Specialists usually present a succession of "global" or "local" indicators, without coherence in the succession of information. They also try to identify information that could trigger the usual analysis procedure. Specialists do not analyse each patient's gait like a computer. They have different experience and allow themselves to be guided by their "know-how".

This study identified 3 distinct gait analysis strategies, 1 for each of the 3 medical and paramedical professions studied. It confirms the unique nature of each professional specialty and the need for a close collaboration in order to provide the best possible care for the patient. Gait charts (9–11) and simple tools, such as a stopwatch, yielding gait velocity and endurance, can also help the professional to collect the global and inter-professional information necessary for a team approach to patient care. This should be taken into account for the teaching and the determination of new gait assessment scales.

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