

USE OF VIDEO RECORDINGS FOR OBJECTIVE FUNCTIONAL ASSESSMENT AFTER POSTERIOR RHIZOTOMY

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OPSOMMING

Die doel van hierdie studie is om vas te stel of dit moontlik is om die voor en na-operatiewe funksionele toestand van serebraal gestremde kinders wat Selektiewe Posterior Rhizotomie ondergaan het, objektief te bepaal en te vergelyk, deur die gebruik van video opnames.

'n Vraelys is onder skole vir serebraal gestremde kinders versprei om fisioterapeute se opinies in verband met die gebruik van video opnames te bepaal.

Elf video opnames is deur twee van die skrywers en fisioterapeute met ervaring in die behandeling van serebraal gestremde kinders, bestudeer. Die twee groepe het probeer om die funksionele toestand van die kinders objektief te bepaal deur gebruik te maak van 'n vorm wat vir hierdie doel opgestel is. Hulle het ook sekere eienskappe van die video opnames getoets, soos onder andere die standarisering van toerusting, kamera hoeke, fisioterapeut se posisie en die opeenvolging van aktiwiteite.

Daar is gevind dat met die gebruik van bestaande video opnames, dit nie moontlik is om hierdie kinders objektief te toets nie. 'n Aanbevole formaat wat gevolg behoort te word in die produksie van toekomstige video opnames, is saamgestel.

KEY WORDS: Video recordings, Function, Cerebral Palsy

INTRODUCTION

The most recent and controversial breakthrough in the management of Cerebral Palsy (CP) has been developed by neurosurgeons using a technique known as Selective Posterior Rhizotomy (SPR). Dr Warwick Peacock pioneered the technique in South Africa in 1980. The controversy surrounding the procedure stems from the inability, thus far, to objectively assess the effects it has had on the children on whom it has been performed.

The successful outcome of SPR depends to a large extent on the correct choice of candidates for this procedure¹. In order to make correct choices the primary aim of the operation which is to relieve spasticity, should always be born in mind. Secondary aims depend on the functional ability of the child prior to rhizotomy.

Since 1980 SPR's have been performed on CP children. Peacock, 1989², noted that the two groups of children who could benefit from this procedure were, ambulatory spastic diplegics and retarded non-ambulatory spastic quadriplegics. In studies of the patients operated on in South Africa it was noted that the spastic diplegics experienced reduction of spasticity post-operatively with improved functional abilities, notably in terms of gait.^{3,4} More involved patients (spastic quadriplegics) also benefited, but in terms of ease of care, positioning, sitting function and increased range of motion, rather than in individual functional activities of daily living. The data collected from this South African group forms the basis for the selection criteria used in the combined neurosurgery and orthopaedic rhizotomy clinic at University of California, Los Angeles².

Until recently follow-up studies have largely been subjective clinical studies¹. An exception is the gait analysis undertaken on ambulatory children operated on in Cape Town in 1985⁵, and more objective methods of evaluating SPR are urgently needed.

This alternative procedure to treatment of CP has aroused the interests of patients, therapists and neurosurgeons alike. Few neuro-

surgeons have had experience or formal training in the evaluation and treatment of CP children. Some concern has been voiced by the more traditionally involved practitioners who contend that the procedure is being utilised by a group with little formal training and experience with this diverse and difficult patient population. Unfortunately, very few orthopaedic surgeons, neurologists, neurosurgeons or paediatricians are in a position to monitor and independently evaluate the results of a neurosurgical procedure. A comprehensive co-operative approach is needed, in which the procedure is carefully employed and thoroughly studied².

Physiotherapists are essential in the treatment and management of CP children and have gained extensive experience in the assessment of these children², thus their involvement in the assessment of the SPR procedure is invaluable.

The assessment of CP has traditionally posed many problems. There is a great need for establishing assessment and recording systems which are objective, valid and reproducible⁶.

The following parameters must be considered for evaluation: range of motion, strength, postural stability, ability to perform graded muscle contraction, selective control and endurance in various functional activities. These may include sitting, standing, transfers, locomotion, dressing, toileting, feeding and mobility for long and short distances².

In 1988, Rosenbaum⁷ expressed the opinion that the use of video recordings for the evaluation of the effects of SPR was a good idea. There is however a need to reduce the data obtained significantly before this method can be efficiently and effectively utilised.

Recently, emphasis has been placed on the use of video recording in the assessment of various functional activities. Staudt (1989) has used video recording for assessment of certain developmental postures and transitional movements based on the degree of the child's independent function⁸. These functional scales were developed as a multi-centre effort by physiotherapists from five centres in the United States of America.

Many of the South African CP schools are using video recordings in an attempt to assess the functional abilities of the children. After initial observation of the video recordings, the authors felt that they lack an adequate standardised structure as well as a recognised professional approach regarding their production. This renders them scientifically inadequate for in-depth objective analysis. For the same reasons it was felt that it would be difficult to assess these video recordings using Staudt's Functional Assessment⁸.

METHODS AND MATERIALS

Sample

Subjects were drawn from three Cerebral Palsy schools in the PWV area. From these schools 15 cases were available, four of which were discarded due to the poor quality of the video recordings.

The sample consisted of five boys and six girls, whose ages ranged between two and ten years pre-operatively. Among the children there were five spastic quadriplegics and six spastic diplegics. All these children had undergone SPR and had been video taped both pre- and post-operatively. In all cases written consent was obtained from the schools for the use of the video recordings in the study.

Procedure

In order to fulfil the aims of the study, one form and two ques-

* Undergraduate project

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tionnaires were compiled. Questionnaire A, which aimed to ascertain the physiotherapist's views on the use of video recordings for the objective evaluation of these CP children, was sent to seven CP schools in the PWV area. Only physiotherapists who were involved in the treatment of CP children who had undergone SPR completed the questionnaire.

Over a three week period the authors assessed all eleven video tapes and each case was documented using a standardised form. The authors aimed to

- Objectively assess the pre- and post-operative functional status of the child using Staudt's Functional Assessment.
- Assess the standardisation of the video recordings
- Review the sequence of developmental functional activities included in each video recording.

Each case was then viewed again. During this second viewing particular attention was paid to the following criteria:

- Visual clarity of the video recordings
- Lighting
- Sound quality
- Standardisation of the physiotherapist's position
- Angle of the camera

The video recordings were then randomly allocated to physiotherapists experienced in the treatment and management of CP children. However, care was taken to ensure that in each case the physiotherapist had no prior involvement with the therapy of that child. Together with the tapes, each physiotherapist was given a second questionnaire and they followed the same protocol when evaluating the tapes. By means of this each physiotherapist was asked to:

- Objectively assess the pre-and post-operative functional status of the child using Staudt's Functional Assessment.
- Assess the outcome of the procedure in each case study.
- Explain the objective grounds on which they had based their conclusions.
- Comment on the standardisation of the format of the video recordings enabling objective conclusions to be reached.

RESULTS AND DISCUSSION

Table I: The results obtained from questionnaire A

USING VIDEO RECORDINGS FOR EVALUATION?	YES	95%
	NO	5%
PREFERRED METHODS OF EVALUATING THE SUCCESS OF SPR	VIDEO RECORDINGS	57%
	COMPUTER ANALYSIS	19%
	FUNCTIONAL ASSESSMENT	90%
	RANGE OF MOVEMENT	57%
	MUSCLE TONE	33%
	SUBJECTIVE EVALUATION	57%
BEST POST-OPERATIVE STAGE AT WHICH VIDEO SHOULD BE TAKEN	3 MONTHS	0%
	6 MONTHS	48%
	9 MONTHS	0%
	12 MONTHS	95%
IS A SPECIFIC SEQUENCE BEING FOLLOWED?	YES	100%
	NO	0%
ABILITY TO QUALITATE/QUANTIFY EFFECTS OF SPR FROM VIDEOS	YES	40%
	POSSIBLY	20%
	NO	40%
AVERAGE PRODUCTION TIME PER VIDEO		42 MINS
AVERAGE PRODUCTION COST PER VIDEO		R20

From Table I it can be seen that 95% of the physiotherapists are presently using video recordings for the evaluation of Selective Posterior Rhizotomy. However, only 57% suggested video recordings as

a preferred method of evaluation. Ninety percent felt that functional assessment is necessary for evaluation. There may be an inference that functional assessment of the children may be achieved using video recordings as 40% of the physiotherapists preferring the use of functional assessment also proposed the use of video recordings.

It was interesting to note that in all the cases viewed by the authors, not once was the testing of ranges of movement or muscle tone omitted from the video recordings. This was in spite of the fact that such little emphasis had been placed on the use of these two measurements as preferred evaluation tools (57% and 33% respectively). Both ranges of movement and muscle tone can only be subjectively assessed from the recordings, and they should therefore be recorded on separate forms. It is not necessary to include them in the video recordings.

The general consensus is that the child should be video taped at six monthly intervals up to two years post-operatively and annually thereafter in order to monitor the progress of the child. The authors feel that it is beneficial to have an early assessment of the child, three months post-operatively, in order to allow the child sufficient time for recovery, but it is also important to document the status of the child before other factors (such as maturity and/or the effects of physiotherapy) have had an influence.

All the physiotherapists currently using video recordings are attempting to follow a specific sequence. However, it is evident from further results obtained by the authors, that they are not being successful in this respect and there is a need to establish a standardised sequence.

From the current average production time of each video recording the authors estimate that it would take 3 hours to assess the progress of the child. This is extremely time consuming and highly impractical in the clinical setting. Provided that the video recordings are standardised and follow an exact sequence (containing the appropriate activities) the authors calculate that each stage should last no longer than 20 minutes. Thus it would be possible to accurately assess the progress of the child within 90 minutes.

Table II: Relationship between the authors' scores and those of the physiotherapists

% OF STATIC POSTURES AND TRANSITIONAL MOVEMENTS THAT WERE ABLE TO BE SCORED	63
% BY WHICH AUTHORS' AND PHYSIOTHERAPISTS' SCORES DIFFERED	19
AVERAGE % BY WHICH THESE SCORES DIFFERED	1,15

Table II shows that it was only possible to score 63% of the static postures and transitional movements present in Staudt's Functional Assessment in the 11 videos reviewed. It is significant to note that there is only a 19% discrepancy between the authors' scores and those of the physiotherapists. Thus, although this method relies on subjective evaluation using an objective scoring scale, there appears to be a high reliability between independent raters.

Although information from the first questionnaire showed that 100% of the physiotherapists felt they had followed an exact sequence of activities both pre- and post-operatively, results show that in only 18% of the cases was this true, as shown in Table III. The sequence is unstandardised not merely because the order of activities has been altered but also because the same activities are not being repeated.

It was noted that in 50% of the cases the following aspects were not standardised:

- the equipment used
- the physiotherapist's position and the amount of support given to the child
- the position of the camera.

An overwhelming majority of the physiotherapists as well as the authors feel that it is necessary to include activities of daily living. We reasoned that the relative ease or the degree of difficulty a child

experienced whilst dressing, eating, playing, etc. determines the child's quality of life. It is thus important to evaluate the procedure's effect in this respect. However, these must be standardised and of short duration.

Table III: General comments pertaining to the video recordings

USE OF EXACT SEQUENCE	YES	18%
	NO	82%
IS IT NECESSARY TO INCLUDE ADL IN THE VIDEO	YES	91%
	NO	9%
HAS SPR FULFILLED ITS PURPOSE?	YES	56%
	NO	44%
DOES VIDEO SUPPLY ENOUGH OBJECTIVE EVIDENCE TO EVALUATE SPR?	YES	50%
	NO	50%

Fifty-six percent of the physiotherapists who viewed the eleven cases felt that Selective Posterior Rhizotomy had fulfilled the purpose for which it was performed. (Table III) However, only 50% felt that the video recordings supplied sufficient objective evidence on which to base this conclusion. Furthermore, 56% of the physiotherapists felt that the child gained other observable benefits from the procedure. Only 10% of the physiotherapists felt however, that the video recordings supply the objective evidence necessary to substantiate their standpoints.

CONCLUSION

The results show that current video recordings being produced for the purpose of assessing the effects of Selective Posterior Rhizotomy on the functional activities of Cerebral Palsied children, lack an adequate standardised structure as well as a recognised professional

approach regarding their production. This renders them scientifically inadequate for indepth objective analysis.

In spite of the shortcomings present in the existing video recordings, the authors and 91% of the physiotherapists feel that, provided that future video recordings are produced following a precise, standardised and comprehensive format, they will play an important role in the objective evaluation of the effects of Selective Posterior Rhizotomy on Cerebral Palsied children.

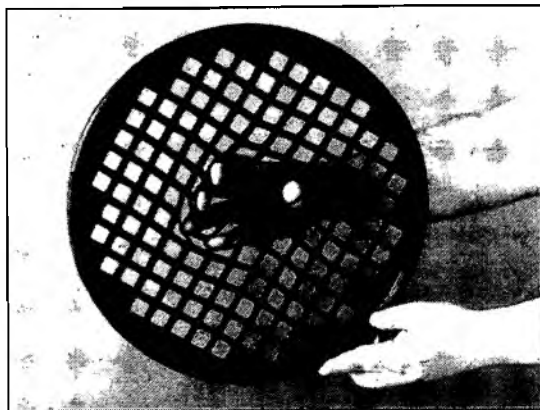
FOOTNOTE:

A standardised format to be followed in the production of future video recordings is obtainable from the Department of Physiotherapy, Medical School, York Road, Johannesburg 2193.

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