Correlation between FLACC scale score and analgesic requirement in children undergoing Minimally Invasive Surgery

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Abstract

Postoperative pain presents several challenges in pediatric Minimally Invasive Surgery. The Faces, Legs, Activity, Cry, and Consolability (FLACC) scale is a valid scale for pediatric postoperative pain. The aim of our study was to assess postoperative pain using FLACC scale and to analyze the correlation between FLACC scale score and analgesic requirement in children underwent Minimally Invasive Surgery. We retrospectively analyzed data of 153 children aged 2 months-3 years who underwent Minimally Invasive Surgery in our unit from January 2019 and December 2019. Postoperative pain assessment was established using FLACC scale. In each patient were analyzed the correlation between FLACC score and analgesic requirement. Pain evaluation was assigned immediately after surgery and at 15 and 60 minutes. 36.6% of patients (56 children) were asleep so considered pain free; 21.6% of patients (33 children) had a FLACC score more than 7 so they required analgesics and the pain assessment 15 and 60 minutes after was significantly lower. 41.8% of patients (64 children) had a postoperative FLACC score less than 3, so they didn't require any analgesic treatment. On the basis of our results, we recommend FLACC scale for postoperative pain assessment in children underwent MIS aged 2 months-3 years. FLACC scale is an effective and precise scale in detection of postoperative analgesic requirement in children and it could be extended in different age groups with further research.

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Introduction

Pain management is an important element of care for patients after surgery, leading to better outcomes, quicker transitions to recovery and improvement in quality of life.

Despite the increasing weight of evidence that infants' and children's experience of pain has a negative impact on short-term and long-term outcomes, pain continues to be poorly managed, particularly in infants and children undergoing surgery.[1,2] Pediatric surgery is always very interested in assessment and management of postoperative pain. The growing attention on Minimally Invasive Surgery (MIS) and in particular Laparoscopy, that has been in pediatric surgeons' repertoire for over 30 years, Esposito et al show several well-known advantages including less post-operative pain compared to open surgery, early return to full daily activities, better cosmetic results, ecc.[3,4,5] Pediatric laparoscopy has benefited from improvements in technology, as well as from an increase in the number of experienced laparoscopic surgeons entering the field.[3,6] The techniques that were developed in adults have been refined for the pediatric population, and have expanded the field in which laparoscopy is used from diagnostic procedures to complex reconstructive surgeries.

It is still true that postoperative pain assessment, and its treatment, in pre-verbal children is still difficult for pediatric nurses and doctors.[3,7]

The generally accepted standard for pain assessment is self-

report. However, infants and children less than 3 years of age are unable to self-report pain and there are some doubts about the capacity of children aged 3–5 years to self-report pain using traditional scales designed for young children. Pediatric nurses are often challenged to identify pain at the preverbal development stage and among nurses, due to inadequate pain management knowledge and practice skills, children's pain is often under treated.

Children vary in their cognitive and emotional development and also in their response to pain and its therapy including postoperative pain. Treatment of pain requires accurate assessment. Several different tools have been used in this age group but with no consensus on the best tool.

Behavioral observation scales are one of the most commonly used alternatives to self-report. The child's behaviors, physiologic parameters, physical examination, and parental reports are included in the assessment of pain in a child of less than 7 years. Crying, body posture and mobility are valid indicators of whether a child is in pain. Physiologic indicators, such as increased heart rate and blood pressure, vary among children just as they do in infants. They also vary in response to illness and should therefore be used only in conjunction with other pain assessment data.

Among different behavioral observation scales, the Face, Legs, Activity, Cry and Consolability (FLACC) scale, designed to assess postoperative pain in young children, is one of the most well-known and most commonly used scale.[8-10] The aim of this study is to assess postoperative pain in children undergoing Minimally invasive surgery using FLACC scale and to analyze the correlation between the scores assessed and the analgesic requirement.

The FLACC Scale

The FLACC scale scores pain intensity by rating 5 behaviors on a 0 to 2 scale; face, legs, activity, consolability, and cry resulting in a maximum score of 10 (Table 1). The range is: 1-4 mild pain; 5-7 moderate pain; 8-10 severe pain.[11-14] To use the FLACC scale, the clinician should observe a child for one to five minutes. A pain score is obtained by reviewing the descriptions of behavior in each of the FLACC categories and selecting the number that most closely matches the observed behavior. The numbers obtained for each category are added together to obtain the total pain score, which will be between 0 and 10. Psychometric properties of the scale suitable for pain assessment in children aged 0 months-3 years.[10,12,15]

Materials and Methods

We retrospectively analyzed data of 153 children (97 boys and 56 girls) affected by urological diseases who underwent Minimally Invasive Surgery in our unit from January 2019 to December 2019. The average age was 20.25 months (range 2 months-3 years). Patients older than 3 years or with neurological diseases were excluded. The procedures adopted were all performed using minimally invasive surgery for urological diseases.

In all patients post-operative pain assessment were established using FLACC scale by our nurses and doctors. The nurses and doctors involved in the study had a separate training session. This training included a discussion of the elements, the definition of behavior and use of the scoring systems. Any queries related to pain assessment tools were resolved by one of the investigators.

Nurses and doctors assigned FLACC pain scores immediately after, and at 15- and 60-minute intervals after surgery for each patient. During the post-operative period a nurse and a doctor were assigned the scales to observe the severity of pain of every child. This assessment was done independently by the observers. Children asleep were considered pain-free. The score of FLACC scale was the sum of rated items and a cut-off limit for analgesic require was <3 for FLACC scale. In each patient was analyzed the variation of FLACC score after analgesic administration. Statistical analysis was performed using the Student t test.

Statistical significance was defined as $p<0.05$.

The study received the appropriate Institute Review Board (IRB) approval at Federico II University of Naples, Italy.

Results

Each patient was evaluated for pain assessment using FLACC scale score by our nurses and doctors. The evaluation was assigned immediately after surgery and at 15, 60 minutes after surgery on 153 children underwent Minimally Invasive Surgery for urological diseases. The average score immediately after surgery was 4.12 at 15 minutes was 3.26 and at 60 minutes was 2.01. The evaluation after surgery showed that, among 153 patients enrolled, 56 children (36.6%) were asleep so they were considered pain free; 97 patients (63.4%) felt pain; 33 of these patients (G1) had a FLACC score more than 7 so they required analgesics and the pain assessment 15 and 60 minutes after analgesic administration was significantly lower (Table 2). FLACC scale showed a significantly decreasing (more than 2 points) after analgesic administration. The choice and technique of intraoperative anesthesia and analgesia were left to the primary anesthesiologist responsible for clinical care of the patient. The remaining 64 patients (G2) had a postoperative FLACC score less than 3, less than the cut-off for analgesic require, so they didn't require any analgesic treatment (Table 3).

Table 1. FLACC scale.

Category	Scoring		
	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squieming, shifting back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers, occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to, distractable	Difficult to console

Score from 1 to 4 mild pain; from 5 to 7 moderate pain; from 8 to 10 severe pain.

Table 2. Group 1 (G1).

Observer	N° patients	Average score immediately after surgery	Average score 15 minutes after surgery	Average score 60 minutes after surgery
Nurse	33	7.63	5.86	3.45
Doctor	33	7.87	6.63	2.84

Average scores immediately after surgery, at 15 min and at 60 min in G1.

Table 3. Group 2 (G2).

Observer	N° patients	Average score immediately after surgery	Average score 15 minutes after surgery	Average score 60 minutes after surgery
Nurse	64	3.26	2.16	1.12
Doctor	64	2.88	2.56	1.09

Average scores immediately after surgery, at 15 min and at 60 min in G2.

Discussion

Behavioral observation scales are one of the most commonly used alternatives to assess pain in children. Over 40 tools have been identified in the literature, many of which were designed for either neonates or infants and children experiencing postoperative pain.[13-16]

What is not well understood is how well these scales perform when used to assess post-operative pain in infants and children. In the last decade, Minimally Invasive Surgery (MIS) has improved its applications among pediatric population becoming, in more and more cases, the gold standard for the treatment of pediatric pathologies. MIS has several well-known advantages including less post-operative pain compared to open surgery, early return to full daily activities, better cosmetic results, ecc.[3,4,6]

However, pain assessment among children is difficult to detect and often consequently underestimated and undertreated especially during post-operative period. Among different behavioral observation scales, the Face, Legs, Activity, Cry and Consolability (FLACC) scale, designed to assess postoperative pain in young children, is one of the most well-known and most commonly used scale but not many papers are available in literature based on how well this scale perform in detection of postoperative pain in children underwent MIS surgery for urological diseases. This scale scores pain intensity by rating 5 behaviors on a 0 to 2 scale. The different ranges are: 1-4 mild pain; 5-7 moderate pain; 8-10 severe pain.

The first FLACC scale was used to assess postoperative pain in infants and children aged 2 months to 7 years but some limitations suggested that the scale could not be used in all circumstances.[1,2] A later review in 2015 by Crellin was able to clearly define the suitability of the FLACC scale to assess pain in infants and children aged 0 months-3 years.[11] We start using FLACC scale score for postoperative pain assessment in the last 10 years and since that the evaluation of postoperative pain and consequently its treatment, changed drastically.

In our study we find out that when postoperative pain is assessed by the FLACC scale the scores of the assessed pain is well related to analgesic requirement: the highest score to the FLACC scale correlates with the analgesic requirement. Moreover, the FLACC scale is very precise and effective in pain assessment in children.

Conclusions

Based on our findings, we recommend FLACC scale for postoperative pain assessment by nurses and doctors in infants and children underwent MIS aged 2 months-3 years as FLACC scores are more accurate and precise. Furthermore, FLACC scale has shown an high grade of effectiveness in detect postoperative pain and analgesic requirement in children underwent MIS for urological diseases. Our results showed that FLACC score is high immediately after surgery in some patients and the score significantly decreases after analgesic administration showing the effective correlation between FLACC score and analgesic requirement. Nurses who assisted with this research found the FLACC scale easy to use and went on to implement it in their own clinical practices.

In conclusion, FLACC scale is a valid method to detect postoperative pain and analgesic requirement in children aged 2 months-3 years underwent MIS for urological diseases and it could be extended in different age groups with further researches.

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