MISCELLANEOUS

Do the severity and the body region of injury correlate with long-term outcome in the severe traumatic patient?

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Abstract
Background and objectives: To investigate if the Injury Severity Score (ISS) and the Abbreviated Injury Score (AIS) are correlated with the long-term quality of life in severe trauma patients.
Methods: Patients injured from 2005 to 2007 with an ISS ≥ 15 were surveyed 16–24 months after injury. The Health Assessment Questionnaire (HAQ-DI) was used for measuring the functional status and the Short Form-12 (SF-12) was used for measuring the health status divided into its two components, the PCS (Physical Component Summary) and the MCS (Mental Component Summary). The results of the questionnaires were compared with the ISS and AIS components. Results of the SF-12 were compared with the values expected from the general population.
Results: Seventy-four patients filled the questionnaires (response rate 28%). The mean scores were: PCS 42.6 ± 13.3; MCS 49.4 ± 1.4; HAQ-DI 0.5 ± 0.7. Correlation was observed with the HAQ-DI and the PCS (Spearman's Rho: -0.83; $p < 0.05$) and no correlation between the HAQ-DI and the MCS neither between the MCS and PCS (Spearman's Rho = -0.21; and 0.01 respectively). The cutaneous-external and extremities-pelvic AIS punctuation were correlated with The PCS (Spearman's Rho: -0.39 and -0.34, $p < 0.05$) and with the HAQ-DI (Spearman's Rho: 0.31 and 0.23; $p < 0.05$). The physical condition compared with the regular population was worse except for the groups aged between 65–74 and 55–64.
Conclusions: Patients with extremities and pelvic fractures are more likely to suffer long-term disability. The severity of the external injuries influenced the long-term disability.
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Introduction

In 1976 the American College of Surgeons Committee on Trauma categorized hospitals in Trauma-Centers; in consequence since then a decrease of mortality has been recognized.[1] However, other questions aroused such as the

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long-term quality of life and outcome improvement of trauma patients.[2]

In 1999 an international consensus conference remarked the heterogeneity of the available instruments for the measurement of the quality of life.[3,4] Several tools have been used: the Short Form-36 questionnaire (SF-36) and the Short Form-12 questionnaire (SF-12), the Glasgow Outcome Scale, the Functional Independence Measure, the Quality of Well-being Scale, the Hannover Score for Polytrauma Outcome and the EuroQOL-5D.[2,5–7] Each one of them has its advantages and limitations, but none of them measure all the dimensions that involve health status in trauma patients. A questionnaire should satisfy the following requirements: understandable, briefness on its accomplishment and analysis, validation in different languages, being of public domain, low cost use and validated for auto administration via e-mail or regular mail and by personal or phone interview. In addition, it should have a worldwide diffusion to be able to establish comparisons between different groups of patients in different countries. Based on these characteristics there are two questionnaires which have been used frequently: the Health Assessment Questionnaire-Disability Index (HAQ-DI) and the SF-12.

The HAQ-DI questionnaire was initially used for assessing rheumatic diseases,[8,9] and afterwards subsequently extended to any kind of condition.[10] The HAQ-DI can be realized in less than 5 min; it has been translated to more than 60 different languages and validated for its use by telephone. The SF-12 questionnaire is also validated to be administered by telephone and it needs only 2 min to be finished. It was initially designed to represent the summary components of the SF-36 with a 90% of precision, which completely overcame[11] and it has been used in the evaluation of patients who suffered multiple trauma, pelvic traumatism or workplace injuries.[12–16]

Recent guidelines have been published by the European Consumer Safety Association[17] grading the disability of trauma patients, in base on a systematic review and expert's opinion. Four different assessing points have been described: the acute phase within the first month; the rehabilitation phase, till 2 months; the adaptation phase, at the fourth month, and the recovery phase, up to 6 months.

The health and quality of life after discharge have been associated to age, sex, comorbidity, the severity of the traumatism and the length of stay at the hospital.[6,7,18–20] The severity of the traumatism is stratified according to the Injury Severity Score index (ISS) which correlates to mortality.[21] The ISS is an anatomical scoring system based on the Abbreviated Injury Scale (AIS) that graduates the severity of the injuries in different anatomical regions.[22] When the ISS is greater than 15 a severe trauma patient can be predicted.[23]

The aim of our study was to determine if the long-term health status of severe trauma, measured by the HAQ-DI and the SF-12 correlate with the extended injuries measured by the ISS.

Methods

After Hospital Ethics Committee approval, a database was created. All trauma patients who were attended in our trauma center due to a blunt or penetrating injury within the years 2005 –2007 were included. Patients who had an ISS $\geq$ 15, with an age $\geq$18 years and who were discharged from the hospital were followed up. The data collected were the demographic characteristics of patients, the type of injury, the ISS, and the AIS.

The HAQ-DI questions were grouped into 8 categories (dressing, rising, eating, walking, hygiene, reach, grip and usual activities), each category was scored from 0 to 3 (0: without any difficulty; 1: with some difficulty; 2: with much difficulty; 3: unable to do); afterwards the average of the 8 categories was made to obtain the score of the questionnaire. In case of the patient needing help or using special devices on any of the categories a correction factor was applied. At least 6 of the 8 categories must be answered or the questionnaire cannot be computed. Scores were classified as 0 meaning no disability, 0–1 mild disability, 1–2 moderate disability and 2–3 severe disability.[8,9]

The SF-12 included 8 categories (physical function, physical role, emotional role, social function, mental health, general health, body pain and vitality). The numerical score obtained in each category was calculated by the sum of the items, and converted to a scale from 0 (worst score) to 100 (best score).[11] The results were divided into two main components, the Physical Component Summary and the Mental Component Summary both validated in the American and the Spanish population, obtaining similar summary component weights for both populations.[24] There are two ways of estimating the summary components: the standard which refers to data from USA, and the specific where the data used refers to each country in particular; we selected de standard form as it is recommended for international publications. Summary components were created reflecting the standard deviation from the average with a value of 50. It was considered a normal health status if the values of the summary components were between 40 and 60; limited health status if the values were below 40; and good health status if the values were above 60.

The results obtained with the SF-12 were compared with those expected from the general population, stratified according to age. The power of the effect size of each population was calculated.

The questionnaires were performed 16–24 months post-injury, by trained personnel via telephone; if the patient did not answer the phone at the first call, three extra calls were made in morning, afternoon and evening times. Losses in follow up were considered if it was not possible to get in touch with the patient or the patient did not want to answer the surveys.

The statistical analysis was performed using the SPSS WIN 15.0 package. We used the Chi-square test (Yates correction and Fisher exact test) to compare the proportions of responders and non-responders. The Kruskal–Wallis was used to compare the categorized scores of the different questionnaires. The Spearman test was used to compare the relationship between quality of life with the ISS and the AIS components. The effect size was used to compare the scores of the responders with that of the reference population. Data are shown as mean and standard deviation or median and range when indicated. A value of $p \leq 0.05$ was considered significance.