

## Tertiary survey in trauma patients: avoiding neglected injuries

Caio Zamboni<sup>a,\*</sup>, Alexandre Maris Yonamine<sup>a</sup>, Carlos Eduardo Nunes Faria<sup>a</sup>,  
Marco Antonio Machado Filho<sup>a</sup>, Ralph Walter Christian<sup>a</sup>, Marcelo Tomanik Mercadante<sup>b</sup>

<sup>a</sup> Orthopaedics and Traumatology Department of Irmandade da Santa Casa de Misericórdia de São Paulo, São Paulo, Brazil

<sup>b</sup> Santa Casa de São Paulo Medical School and Orthopaedics and Traumatology Department of Irmandade da Santa Casa de Misericórdia de São Paulo, Brazil

### KEYWORDS

Delayed diagnosis  
Diagnostic errors  
Multiple trauma  
Neglected diseases

### ABSTRACT

**Introduction:** Medical personnel in trauma centres in several countries have realised that undiagnosed injuries are common and are now focussing their attention on reducing the incidence of these injuries. Tertiary survey is a simple and easy approach to address the issue of undiagnosed injuries in trauma patients. Tertiary survey consists of reevaluating patients 24 hours after admission by means of an anamnesis protocol, physical examination, review of complementary tests and request for new tests when necessary.

**Objective:** To show the importance of tertiary survey in trauma patients for diagnosing injuries undetected at the time of initial survey.

**Methods:** A standardised protocol was used to perform a prospective observational study with patients admitted through the emergency department, Department of Orthopaedics and Trauma, Santa Casa de São Paulo. The patients were reevaluated 24 hours after admission or after recovering consciousness. New physical examinations were performed, tests performed on admission were reassessed and new tests were requested, when necessary.

**Results:** Between February 2012 and February 2013, 526 patients were evaluated, 81 (15.4%) were polytraumatised, and 445 (84.6%) had low-energy trauma. A total of 57 new injuries were diagnosed in 40 patients, 61.4% of which affected the lower limb. Diagnosis of 11 new injuries (19.3%) resulted in changes in procedure.

**Conclusion:** The application of the protocol for tertiary survey proved to be easy, inexpensive and beneficial to patients (particularly polytraumatised patients) because it enabled identification of important injuries that were not detected on admission in a large group of patients.

© 2014 Elsevier Ltd. All rights reserved.

### Introduction

Neglected injuries in trauma patients may occur at critical moments of great complexity during the evaluation of these patients in the emergency room [1,2]. When treating trauma patients, whether they have low or high-energy trauma injuries, the initial approach should be as recommended by the American College of Surgeons in the Advanced Trauma Life Support (ATLS), which includes primary and secondary surveys [3]. This approach should also be used for other patients who spontaneously seek medical assistance; these patients then undergo physical examination according to their symptoms.

The negative impact of undiagnosed injuries is both described and understood: these injuries cause morbidity and impair patient prognosis [4]. At the time of initial survey, the polytraumatised patient often presents with an altered

level of consciousness (head trauma, intoxication or sedation). Furthermore, the medical staff's attention may be more closely focussed on symptomatic injuries and the need for a surgical emergency procedure, rather than conducting a thorough and careful detailed secondary survey.

A tertiary survey was conducted in a study by Enderson et al to decrease the frequency of neglected injuries [4]. This new examination after emergency care included new anamnesis and detailed physical examination. Ancillary tests were also reviewed and further diagnostic procedures were conducted, as necessary.

The tertiary survey should be conducted 24 hours after hospitalisation and should comprise a detailed evaluation of the trauma patient. Thus, the trauma patient is subjected to a primary survey in the pre-hospital or hospital environment, secondary survey in the emergency room, and tertiary survey 24 hours after admission to hospital.

### Methods

The study was approved by the Ethics Committee for Research in Humans of the Santa Casa de São Paulo Medical School.

\* Corresponding author at: Alameda dos Jurupis, 900, apto 144, torre 1 – Moema, São Paulo/SP, Brasil – CEP 04088-002. Tel.: (+5511) 33380429/991983913; fax: (+5511) 33380429.

E-mail address: [caiozamboni@hotmail.com](mailto:caiozamboni@hotmail.com) (C. Zamboni).

Between February 2012 and February 2013, 526 patients admitted to the emergency department, Department of Orthopaedics and Trauma, Santa Casa de Misericórdia de São Paulo who were diagnosed with at least one traumatic injury to the musculoskeletal system and needing surgical treatment, were evaluated. The current investigation was characterised as a prospective observational study.

The tertiary survey protocol was applied and these patients underwent medical reevaluation 24 hours after hospitalisation [5].

Patients who remained unconscious underwent clinical reevaluation, orthopaedic physical examination and imaging tests, when necessary, after they recovered consciousness.

Patients were excluded from the study if they had pathological fractures of any aetiology; were hospitalised for less than 24 hours; or they explicitly did not wish to participate in the study after receiving the necessary clarifications.

The tertiary surveys were conducted by one of the three resident physicians in training, with the condition that the physician who conducted the tertiary survey had not conducted the initial or secondary surveys on that particular patient. The study protocol included data on identification, anamnesis and physical examination. Data recorded included the time that reevaluations were conducted, whether additional tests were needed, and a description of further specialised evaluations. The reasons for diagnostic failure were proposed.

According to the proposed protocol, the following parameters were identified: sex; age; body mass index (BMI); mechanism of injury; time of hospital admission and initial diagnosis. An itemised anamnesis was then performed, followed by a systematised and protocol-driven clinical examination.

Data were compiled in tables and graphs using parametric tests with two variables. The chi-squared test was used to analyse qualitative data and the Student's t-test was used to analyse matched qualitative and quantitative data.

## Results

A total of 526 patients were evaluated; 339 (64.4%) were male and 187 (35.6%) were female.

Patients were divided into two groups for statistical analysis: Group 1 included patients who had no additional diagnosis after application of the tertiary survey protocol; and Group 2 included patients with at least one new traumatic lesion following tertiary survey. The mean age was 44 years for patients in Group 1 and 40.2 years for those in Group 2. The average BMI was similar in both groups: 25 kg/m<sup>2</sup> in Group 1 and 25.2 kg/m<sup>2</sup> in Group 2.

Table 1 lists the mechanism of injury and the incidence of these traumatic events in the study patients. A total of 81 patients (15.4%) were considered to be polytraumatised, i.e. they presented with injuries to more than one system or segment, with one of those being potentially fatal. The other 445 patients (84.6%) did not have injuries to more than one system or segment, so were not considered to be polytraumatised.

A total of 57 new injuries in 40 patients (7.6%) were diagnosed at the tertiary survey; these injuries had not been diagnosed at either the primary survey or by a specialist during the secondary survey. One polytraumatised patient died during the study before completion of the tertiary survey.

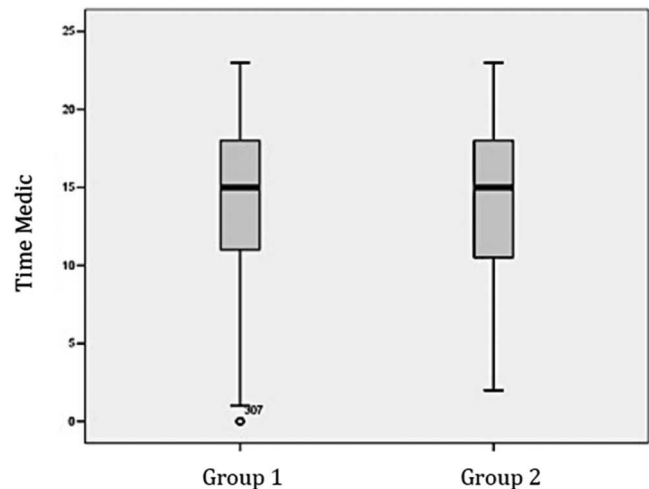
There was no proven correlation between patient age and undetected injuries. There was no significant difference in the mean age of patients in Groups 1 and 2 using the Student's t-test.

The time of initial care and the frequency of undetected injuries were investigated in case the fatigue of the medical staff on duty influenced the outcome. Negligence in diagnoses made in the evening-night-dawn period (between 7:00 p.m. and

**Table 1**  
Mechanism of injury and incidence of traumatic events in study patients

Mechanism of injury	Cases	Percentage (%)
Fall to the ground	168	31.9
Fall from height	70	13.3
Firearm injury	6	1.1
Automobile accident	28	5.3
Motorcycle accident	104	19.8
Run-over event	65	12.4
Sports activity	12	2.3
Aggression	24	4.6
Other	49	9.3
Total	526	100

Source: Results found after application of the tertiary survey protocol. Study conducted at the Department of Orthopaedics and Trauma, Santa Casa de São Paulo.



**Fig. 1.** Boxplot representing the time patients from Groups 1 and 2 received medical care. Source: Results found after application of the tertiary survey protocol. Study conducted at the Department of Orthopaedics and Trauma, Santa Casa de São Paulo.

7:00 a.m.) was compared with that in the daytime (between 7:00 a.m. and 7:00 p.m.). As shown in Figure 1, the results for the two groups are similar, which shows that medical staff fatigue did not influence the frequency of undetected injuries ( $p = 0.432$ ).

The locations of the newly diagnosed injuries that resulted from the tertiary survey are shown in Figure 2. The lower limb was more commonly affected, with 35 neglected injuries (61.4%), followed by the upper limb, with 11 (19.2%) neglected injuries. The remaining lesions were located in the ribs, facial trauma and elsewhere (total 19.4%).

The treatment for these newly diagnosed injuries was mostly bloodless and involved temporary immobilisation or observation. However, diagnosis of 11 new injuries (19.3%) in 10 patients resulted in alterations in procedure, including changing the surgical access to be used, using a different implant than that previously planned, conducting a new surgical procedure in the same surgical access, or performing a new surgical procedure on another body segment.

A total of 67 of the 80 polytraumatised patients who underwent tertiary survey had no neglected injuries (Group 1), and 13 had neglected injuries (Group 2). The hypothesis that undiagnosed injuries are more common in polytraumatised patients compared with patients with low-energy trauma was tested using the chi-squared test. The result of  $p = 0.002$ , i.e. with a significance level greater than 95%, confirmed the hypothesis

Download English Version:

<https://daneshyari.com/en/article/3239870>

Download Persian Version:

<https://daneshyari.com/article/3239870>

[Daneshyari.com](https://daneshyari.com)