Introduction

Syncope is a frequent finding in clinical practice, accounting for 1-3% of all emergency room visits and 1-6% of all hospital admissions\(^1\,\text{--}\,3\). In the general population the most common form of syncope is represented by vasovagal syncope, which is responsible for 30-50% of all episodes of transient loss of consciousness requiring medical attention\(^4\,\text{--}\,5\). Such a clinical condition is usually considered as a benign affection, despite the frequent association with physical injuries and the potential hazards deriving from its possible recurrence\(^6\,\text{--}\,7\).

The present clinical investigation was designed and undertaken in order to assess the prevalence and clinical correlates of syncope-related traumatic injuries in a cohort of consecutive patients with recurrent vasovagal syncope.

Methods

Patient population. The study population consisted of 346 consecutive patients (204 women and 142 men, mean age 42.6 ± 17.4 years) who were referred to the Syncope Clinic of our Institution (April 1994-November 1999) for the evaluation of recurrent unexplained syncope and in whom a diagnosis of vasovagal syncope was established. Syncope was defined as a sudden transient loss of consciousness with the inability to maintain postural tone and with spontaneous recovery\(^1\,\text{--}\,6\). Each patient had experienced at least two syncopal episodes in the 6 months preceding the first visit to the Syncope Clinic.

Diagnostic criteria. In each patient the cause of syncope was established according to the results of standardized diagnostic
work-up and by strictly adhering to previously report-
ed diagnostic criteria. In fact, all patients were con-
sidered as affected by vasovagal syncope when pre-
senting the following features: 1) no clinical or lab-
oratory evidence of any cardiac, neurological or meta-
bolically cause for the recurrent syncopal spells; 2) positive
response to head-up tilt testing.

In particular, the preliminary diagnostic evaluation
included history, physical examination, full routine lab-
oratory tests, 12-lead standard electrocardiography, ex-
ercise electrocardiography, Doppler echocardiography,
24-hour electrocardiographic monitoring, bilateral carotid
sinus massage, electroencephalography, and duplex ul-
trasound scanning of the carotid arteries. Besides, when
clinically indicated, computed tomographic scans and
magnetic resonance imaging of the central nervous sys-
tem and cardiac electrophysiologic study were also per-
formed. When such a diagnostic work-up could not es-

tablish the cause of syncope, the patient underwent tilt
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Tilt testing. The test was performed in the morning, in
a fasting state. An electronically controlled tilt table
with a foot-board for weight-bearing and restraining
belts was used for the procedure. Continuous electro-
cardiographic monitoring for heart rate and rhythm was
performed, while blood pressure was non-invasively
beat to beat measured by means of an Ohmeda Finapress
2300 photoplethysmographic device (Louisville, CO,
USA). Subjects were initially tilted at 60° for 30 min
(control phase). Subsequently, if there were no symp-
toms, participants received 1.25 mg of isosorbide di-
trate sublingually and continued to be tilted for an ad-
ditional 15 min (pharmacological phase). The test was
considered positive if syncope occurred in association
with hypotension, bradycardia or both. In the case of syn-
cope, the procedure was terminated by rapidly lowering
the tilt table to the horizontal position. In accordance with
previous reports and for the purpose of the study, two
main forms of positive response to the tilt table test
were identified: 1) a vasodepressor form (syncope as-
associated with a systolic blood pressure decrease to ≤ 60
mmHg, but without significant heart rate reduction); 2)
a cardioinhibitory form (syncope associated with a sys-
tolic blood pressure decrease to ≤ 60 mmHg and heart
rate reduction to < 40 b/min). Furthermore, as in previous
studies, the following tilt test variables were also con-
sidered: 1) test phase in which syncope occurred; 2)
time to tilt-induced syncope; 3) peak systolic blood
pressure and peak heart rate preceding tilt-induced syn-
cope, as synthetic indexes of the hemodynamic behav-
ior during the test.

Syncope questionnaire. At the time of the initial eval-
uation, each patient was interviewed using a standard
questionnaire. A detailed account of syncopal spells
was obtained in all cases. Moreover, all available wit-
nesses were interviewed, in order to collect all possible
information about the specific circumstances and the pa-

tient’s appearance and behavior during the episodes.
Information about the overall absolute number and fre-
quency of syncopal episodes was also obtained. All pa-

tients were questioned about the occurrence of trauma
during syncopal spells. Syncope-related traumatic in-
juries were classified as previously described: 1) ma-

jor trauma (any fracture, head injury, internal organ
damage requiring hospital admission and surgical treat-
ment); 2) minor trauma (any bruise, cut and soft tissue
injury).

Statistical analysis. Mean values (± SD) were calculated
for continuous variables and frequencies were measured
for categorical variables. Collected data were analyzed
by unpaired Student’s t-test for continuous variables and χ²
categorical variables. Correlations between
variables were assessed using linear regression analysis
and Pearson’s correlation coefficient.

Results

During the first visit to the Syncope Clinic 94 of the
346 patients (27.2%; 43 women and 51 men, mean age
44.8 ± 16.8 years) reported at least one syncope-relat-
ed traumatic injury. In 31/346 cases (8.9%) the sev-

erity of physical injuries had determined at least one hos-
pital admission and surgical treatment, while 52/346
(15.0%) patients had suffered from more than one syn-
cope-related trauma. When compared to the rest of the
study population, patients with syncope-related injuries
showed a higher prevalence of male gender (54.2 vs
36.1%, p < 0.01), a higher absolute number (7.3 ± 3.3
vs 3.4 ± 1.9, p < 0.01) and a higher frequency (0.17 ±
0.11 vs 0.05 ± 0.04 spells/month, p < 0.01) of syncope
spells in their clinical history. These patients also reported
a shorter duration of prodromal warning symptoms pre-
ceding spontaneous syncope (21.9 ± 13.6 vs 117.4 ± 87.1
s, p < 0.01) and showed a higher prevalence of positive
cardioinhibitory response to tilt table testing (43.6 vs
22.6%, p < 0.01). However, no significant difference was
found between the two groups as to all other tilt test vari-
ables. In fact, the prevalence of a positive response dur-
ing the control unmedicated phase of the test (39.3 vs
37.7%), the mean time to tilt-induced syncope (14.7 ±
8.1 vs 15.2 ± 8.7 min in the control phase and 8.6 ± 3.9
vs 8.3 ± 4.2 min in the pharmacological phase), as well
as the peak systolic blood pressure and the peak heart
rate preceding tilt-induced syncope (131.6 ± 22.8 vs
134.7 ± 27.4 mmHg and 123.4 ± 19.5 vs 126.7 ± 24.9
b/min), were found to be similar in patients with and
without syncope-related trauma.

When the severity of trauma was considered, patients
with major syncope-related injuries were found to have
both a higher absolute number of traumatic episodes (2.7
± 1.6 vs 1.7 ± 0.9, p < 0.001) and of syncopal spells (9.6 ± 3.7 vs 6.0 ± 2.7, p < 0.001), than subjects with minor syncopal-related trauma.

In the whole study population the number of syncopal-related injuries was found to correlate significantly with the number of syncopal spells \( (r = 0.64, p < 0.01) \) (Fig. 1).

Discussion

Vasovagal syncope rarely represents a life-threatening affection\(^1,4,6\). In fact, prospective investigations have shown that patients with vasovagal syncope carry a risk of subsequent sudden death, which is similar to that carried by the general population\(^1,4,6\). However, the available evidence as to the overall long-term morbidity and mortality of vasovagal fainters is quite limited and substantial concern persists about the unpredictable results of single specific episodes in particular circumstances\(^16,17\). As a matter of fact, physicians are aware that the clinical consequences of a single vasovagal spell critically depend upon two main factors: 1) the specific circumstances in which syncope occurs (place, activity); 2) the preexisting clinical status of the vasovagal fainter (age, concomitant diseases). In fact, vasovagal syncope while driving has been associated with catastrophic and fatal accidents\(^16\), whereas a significant percentage of major traumatic injuries in elderly subjects (hip fractures) is known to be related to vasovagal episodes\(^17\). Consequently, the clinical assessment of patients with recurrent vasovagal episodes should always consider all factors which may result in a significant risk of major traumatic injuries in elderly subjects (hip fractures) is known to be related to vasovagal episodes\(^17\). Consequently, the clinical assessment of patients with recurrent vasovagal syncope should always consider all factors which may result in a significant risk of major syncopal-related trauma (i.e. age, estimated frequency of syncopal recurrences, comorbidities, specific employment, sports activity)\(^18\).

In this study 27.2% of patients with recurrent vasovagal syncope had at least one syncopal-related traumatic injury in their clinical history. This finding is in accordance with previous studies which have reported similar data about the prevalence of syncope-related trauma in vasovagal fainters (15-35% of cases)\(^4,7\). In our series traumatic events were likely to recur, as 55.3% of patients with syncopal-related injuries showed more than one traumatic episode. Besides, in a non-negligible percentage of cases (8.9%) syncope-related lesions were found to be clinically relevant, requiring hospital admission and surgical treatment. Furthermore, in this population, the probability of suffering from a syncopal-related traumatic lesion increased with the growing number of syncopal episodes, as shown by the correlation between the number of syncope-related injuries and the number of vasovagal spells.

Another major finding of this study is represented by the opportunity of defining a general clinical profile of the trauma-prone vasovagal fainter. In fact, in this series, male subjects, with a higher rate of syncope recurrence, brief warning symptoms before spontaneous syncopal spells and a cardioinhibitory response to head-up tilt testing, showed a relatively higher incidence of syncope-related injuries. In previous reports patients with similar clinical features have already been identified as affected by the so-called “malignant” form of vasovagal syncope, which has been associated with a significant short-term morbidity\(^10,19,20\). Accordingly, this specific subset of patients with recurrent vasovagal syncope should be considered for a closer clinical follow-up\(^10,18,20\).

Most practicing physicians tend to consider vasovagal syncope as simply a benign affection in young people. However, recurrent vasovagal syncope is associated with significant traumatic lesions in a relevant percentage of cases. Careful risk stratification is therefore mandatory in the individual patient with vasovagal syncope and should consider all clinical factors possibly associated with increased morbidity\(^21,22\). In particular, patients with a high rate of syncope recurrence and previous trauma may require therapeutic intervention, in order to prevent further spells and reduce possible trauma-related morbidity.

![Figure 1. Correlation between the number of syncope-related injuries and the absolute number of syncopal spells in the clinical history.](image-url)
References