Prospective evaluation and outcome of patients admitted for syncope over a 1 year period

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Aims Syncope is a frequent and potentially dangerous symptom. The epidemiological data are based on series mainly collected 20 years ago in the U.S.A. and do not adequately assist in the management of patients admitted now for this symptom in Europe.

Methods and Results To evaluate prospectively the epidemiological aspects and the management of the patients admitted in the emergency department of an adult university hospital for a 'verified' syncope, charts of all the patients consecutively admitted between June 1999 and June 2000 were systematically reviewed by a member of the cardiology staff. Those with a loss of consciousness were selected and those with a definite syncope were included in the study group and followed until they were discharged from the hospital. Among the 37 475 patients who presented to the emergency department, 454 (1·21%) had a definite syncope. For 296 it was the first episode and 169 (mean age 43 ± 23 years) were discharged straight away; 285 (mean age 66 ± 19 years; $P<0·0001$) were admitted to internal medicine (n=151), cardiology (n=65), neurology (n=44), endocrinology (n=14) and surgery (n=11) services. In 75·7% of all the patients a diagnosis was reported but it was inadequate to explain a syncopal episode in 56 cases (16·3%). Management differed by department: 36% of the patients had 'neurological' investigations mainly in internal medicine and neurology. Except in cardiology very few had 'cardiological' investigations particularly tilt test and electrophysiological studies (5%).

Conclusion Syncope is a frequent symptom but its cause often remains unknown partly due to inadequate management. Precise and simple guidelines are urgently needed.
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Introduction

As syncope is considered a potentially dangerous symptom[1–4], patients are frequently admitted to hospital to undergo various and expensive investigations many of which have a low diagnosis yield. In a recent study based on data from Medicare almost 200 000 patients were hospitalized in 1993 for syncope in the U.S.A. and the cost per discharge varied from $4132 to $5281[5]. Based on these elements syncope has emerged as a general medical problem but epidemiological data are established on series collected in the U.S.A. almost 20 years ago[6–11]. The present work was conducted because very few studies are available, particularly from Europe[12].
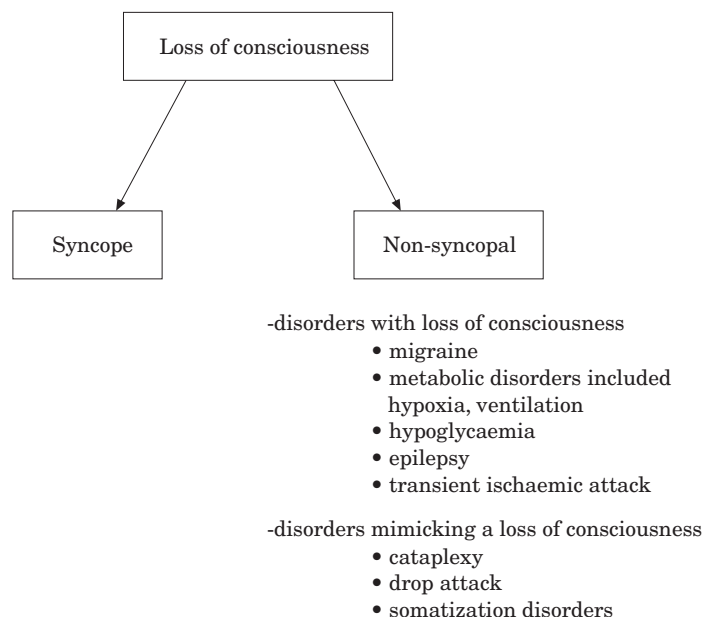
Methods

Definition

The definition of syncope used in this study is widely accepted and formulated as a transient, self-limited loss of consciousness associated with an inability to maintain postural tone and not compatible with other states of altered consciousness (seizure, coma, etc . . .). The onset has to be rapid and the recovery complete, and prompt[7].

Patient inclusion process

Charts of every patient admitted to the emergency department of one of the Brest University Hospitals from June 1999 to June 2000 were reviewed by one member of the staff of the Cardiology Department of this 750-bed general hospital for adults (minimum age 16). Patients referred from other hospitals for

Loss of consciousness

Syncope   Non-syncopal

-disorders with loss of consciousness
- migraine
- metabolic disorders included hypoxia, ventilation
- hypoglycaemia
- epilepsy
- transient ischaemic attack

-disorders mimicking a loss of consciousness
- cataplexy
- drop attack
- somatization disorders

Figure 1   **Diagnostic classification of transient loss of consciousness.**

evaluation of syncope and directly admitted to a medical department (cardiology, neurology, . . .) were not included in the present study. The decision to admit the patient to a department of the hospital for further investigations was made by the physician(s) on duty in the emergency department.

Recruitment was a two-stage process: (1) selection of patients with a definite loss of consciousness by daily consulting the charts of the patients admitted to the emergency department in the prior 24 h. All those with a complete self-reported loss of consciousness were selected and those with dizziness, pre-syncope, vertigo, falls were excluded. In case of doubtful diagnosis of loss of consciousness the patient (and when possible his family) was contacted either in person or by phone to precisely define symptoms and to classify the patient as has having had or not a definite loss of consciousness; (2) exclusion of patients with loss of consciousness which did not correspond to the above mentioned precise definition of syncope (for example: seizure, panic disorder, hypoglycaemia, ischaemic attack . . .) (Fig. 1). After this screening, only patients with syncope were included. For every patient admitted to the hospital, charts were reviewed after discharge to collect information on investigations performed and the final diagnosis. To avoid any modification in the usual practice, only the chief of each department was informed at the beginning of the study. Other members of the staff were not informed of the study. Since this was an observational study we did not promote standardized diagnosis and investigations.
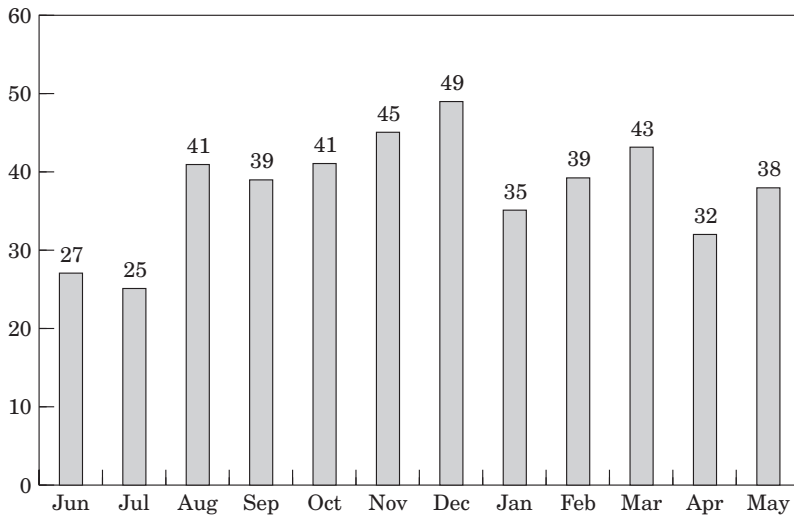
Statistical methods

Data are presented as mean ± standard deviation. Continuous variables were compared using Student t-test.

ANOVA test was used for multiple comparisons. Uniformity distribution of the monthly and the daily number of hospitalizations were performed using the chi-square test. We set the statistical level of significance at $P<0.05$. Statistical analysis was performed using The StatView 4.5 software (Abacus concepts, Inc.).

Results

During the 1 year study period 37 475 patients attended the emergency department. Using our protocol, 454 (1·21%) were diagnosed as having had syncope (197 men, mean age 57 ± 23 years). For 296 patients (65·2%) it was the first episode and for 158 a recurrent one. Of these 158 patients, the first episode had occurred within the year in 109 patients (31 had one, 73 between two and five and five more than five) and within more than 1 year for 49 patients (one episode in 27 patients and more than one in 22 patients). Admission was advised in 285 patients (62·8%); these patients were older than those who were discharged (66 ± 19 years vs 43 ± 23 years; $P<0.0001$). Patients were hospitalized in the following departments: internal medicine 151, cardiology 65, neurology 44, endocrinology 14, surgery 11 (traumatology six and neurosurgery five) and psychiatry one. The number of patients admitted per month in the emergency room is summarized in Fig. 2. There was no significant difference between admission rate by month although a decrease was observed during the summer period. The same analysis was performed for the day of the week and a lower number of patients were admitted on Friday as compared to the other days of the week ($P=0.07$) (Fig. 3). The mean length of the hospital stay varied according to the department but differences were
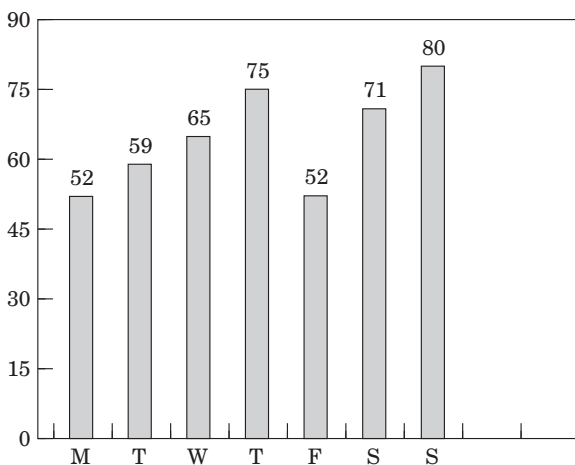
Figure 2 **Numbers of patients admitted to the emergency room according to the month.**

not statistically significant among cardiology (6·2 ± 4·9 days), neurology (7·1 ± 5·5 days) and internal medicine (6·6 ± 5·2 days).

Diagnosis

Among the 454 patients of the study group, 344 (75·7%) were considered to have a diagnosis for their syncopal episodes. The diagnoses are reported in Table 1. In 56 (16·3%) of these, loss of consciousness could be explained, but not a syncope as defined above. The most common conditions are represented by hypoglycaemia (31 cases or 9%) and transient cerebral ischaemic attack (seven cases or 2%). If these diagnoses are added to the undiagnosed group, a total of 166 patients (36·6%) had no diagnosis or conditions not defined as syncope by our study. Although more patients had a 'diagnosis' (Table 2) in cardiology than in other departments,

Figure 3 **Patients admitted to the emergency room according to the day of the week.**

the difference was not statistically significant ($P=0\cdot42$ between cardiology and internal medicine and $P=0\cdot17$ between cardiology and neurology).

All the patients admitted to the hospital or discharged directly from the emergency department had a complete physical examination, an electrocardiogram and baseline screening laboratory tests. Among the 169 discharged patients, 35 had additional examinations either during their stay in the emergency room (five cases) or during the days following on an outpatient basis (30 cases): electroencephalography in eight cases, head CT scan in 11, lumbar puncture in one, tilt test in one and Holter monitoring in one; the remaining 13 patients were advised to consult psychiatrists (six cases), cardiologists (four cases) or gastroenterologists (three cases). For the patients directly discharged from the emergency room, the most frequent diagnosis was vasovagal syncope (97 among 169 or 57%) and the second most common was hypoglycaemia (13 or 8%). However, in 13 patients with the diagnosis of hypoglycaemia and a verified abrupt loss of consciousness, there was only a minimal decrease in serum glucose. Thus, the diagnosis of hypoglycaemia appears erroneous. Finally 40 patients (24%) left the emergency room without any diagnosis and only half of these patients had been advised to have a further examination or visit.

Investigations

For the admitted patients, 'investigations' performed to diagnose the aetiology of the syncope differ depending on the department to which they were admitted. The most frequently performed investigation was a head CT scan or magnetic resonance imaging in 29·8% of the patients which was largely done in the departments of internal medicine (46 patients 30·5%) and neurology (24 patients or 54·5%). An electroencephalogram was

Table 1   Diagnostic classification of transient loss of consciousness

I   Syncope

Neurally-mediated syncopal syndromes

Vasovagal faint (common faint)	202
Carotid sinus syncope	3
Situational faint	
acute hemorrhage	3
cough, sneeze	7
gastrointestinal stimulation (swallow, defecation, visceral pain)	2
Glossopharyngeal trigeminal neuralgia	1

Autonomic failure

Primary autonomic failure syndromes (e. g. pure autonomic failure, multiple system atrophy, Parkinson's disease with autonomic failure)	6
Drugs and alcohol	13

Cardiac arrhythmias as primary cause

Sinus node dysfunction	1
Atrioventricular conduction system disease	10
Paroxysmal supraventricular and ventricular tachycardias	23
Implanted device (pacemaker, ICD) malfunction	1

Structural cardiac or cardiopulmonary disease

Cardiac valvular disease	2
Acute myocardial infarction/ischaemia	3
Obstructive cardiomyopathy	
Atrial myxoma	
Acute aortic dissection	
Pericardial disease/tamponade	1
Pulmonary embolus/pulmonary hypertension	4

Cerebrovascular

Subclavian steal syndromes	1
Multifactorial	5

II   Non-syncopal

Disorders with loss of consciousness

Migraine	3
Metabolic disorders, including hypoxia, hyperventilation	3
Hypoglycemia	31
Epilepsy	
TIA	7

Disorders mimicking a loss of consciousness

Drop attacks	
Somatization disorders	12

Table 2   Number (n) and percentage (%) of patients discharged from the hospital with a 'diagnosis' according to the department

	n	Diagnosis n (%)	Erroneous n (%)	Total
Internal medicine	151	108 (71·5%)	13 (8·6%)	105 (69·5%)
Neurology	44	28 (63·6%)	4 (9·1%)	24 (54·5%)
Cardiology	65	56 (86·1%)	2 (3·1%)	54 (83%)
Total	260	192 (73·8%)	19 (7·3%)	183 (70·4%)

almost systematic in neurology (26 patients or 59·1%) but less common in other departments (21 patients (13·9%) in internal medicine). Cardiological investigations (except for echocardiogram and Holter monitoring performed in 8·4% of the patients but in fact more frequently if patients admitted to cardiology and who had continuous monitoring for 24 h (50 patients) are added) were seldom performed and almost exclusively for patients admitted in cardiology (tilt testing in 11 patients (16·9%) and electrophysiological study in nine or 13·8%). When internal medicine and cardiology departments are compared 82 neurological (54%) and nine cardiological tests were performed in the 151 patients admitted to internal medicine; in the 65 patients hospitalized in cardiology, 12 or 18% ($P<0·0001$) had neurological tests and 64 or 98% ($P<0·001$) had cardiological tests.

Discussion

An important finding of the present study is that syncope remains a frequent cause of admissions, accounting

for more than 1·2% of all adult admissions to a University hospital. This percentage is an underestimate since some patients are admitted directly to cardiology or neurology departments for specific evaluation. This proportion is slightly lower than the one reported 20 years ago in the U.S.A. but remains in the same range[6] and similar to the one found in Italy[13]. The distribution of patients within the months of the year and the days of the week, with a fall in admission rate during Friday, has not previously been reported. These observations require further study to determine whether trends similar to sudden death are observed for syncope.

Methodological issues

Epidemiological studies have been hampered by several biases making their interpretation uncertain. The first limitation often encountered is lack of distinction between loss of consciousness and other conditions such as dizziness, vertigo, drop attacks. The second major issue is that among different causes of loss of consciousness, the difference between syncopal and non-syncopal aetiologies has not been clearly established and therefore, a transient ischaemic attack may erroneously be considered a cause of syncope. These two limitations have been taken into account in the present study. The third issue is that frequently, in the presence of a clinical setting suggestive of syncope, an inadequate approach in the management of the patient may lead to incorrect diagnosis and treatment. For example, a patient with exercise-related syncope and left bundle branch block may be diagnosed as having had a vasovagal syncope while actually having intermittent high degree AV block as a cause. If electrophysiological study or other investigations (e.g. loop monitoring) are not performed, the diagnosis may be missed. These limitations emphasize the importance of a systematic approach in evaluating patients with syncope.

Diagnosis

The percentage of patients leaving hospital with a 'diagnosis' (75·7%) is significantly higher than in previously reported series (52·5% in the study of Kapoor et al.[7] and 62% in Blanc et al.[14]), but lower than in others (87% in Day et al.[6] and 82·5% in the OESIL study[12]). However, most of these series were retrospective[6,7] and the recruitment of patients varied from emergency room exclusively[6] to hospital stay[13] or both[7]. Our methodology was different: we prospectively observed the follow-up and management of patients admitted exclusively for syncope in the emergency department of a university hospital until they were discharged. The percentage of diagnosis is department-dependent. It is higher in cardiology than in other departments, although this does not indicate that the 'correct' diagnosis was established.

Emergency room management

As the physician on duty in the emergency room changed every day, the management of patients was not standardized but varied according to their specialty, experience. Cardiologists were not included in the physicians on duty in the emergency room but could be easily contacted if necessary. For all patients, history, physical examination, baseline laboratory tests and electrocardiogram were systematically recorded. After this preliminary work-up, and depending on the decision of the senior physician, patients were either admitted or discharged. Since we systematically reviewed each case and contacted patients about loss of consciousness when there was a doubt, we feel the diagnosis of syncope was ascertained with a high probability. However, the cause of syncope in patients who were directly discharged was based on the diagnosis made by the physician on duty. Although this diagnosis is made by only a few members of the medical staff, it reflects the current practice for patients admitted in many hospitals.

For patients directly discharged from the emergency room, the most frequent diagnosis was vasovagal syncope (57%). However, many were discharged without any definite diagnosis and only half were advised to have further examinations. It should be stressed that these patients are much younger than those admitted to hospital and that the physician on duty probably had a high suspicion of a diagnosis of vasovagal syncope. A striking finding is the number of neurological examinations (i.e. electroencephalography or cerebral scanner) either in the emergency room or during the following days, while only six were advised to consult a cardiologist or to have cardiological examinations. Of great interest is the fact that hypoglycaemia, although found at only modest levels, was considered by many physicians as a potential cause of syncope.

In-hospital management

Although 75% of the patients were discharged with a diagnosis, in a minority of cases (16%) the symptoms were inadequate to explain a syncopal episode. These patients had a clear syncope, but the diagnosis of hypoglycaemia or transient cerebral ischaemic attack, could not account for their syncopal episode. This is a crucial issue in the setting of syncope; a supposed cause of loss of consciousness could be misleading as the cause of syncope and leave the real diagnosis unknown. The management of patients with syncope was often inadequate: almost one third of the patients had neurological testing which, even though revealing an abnormal result could not explain a syncope[15,16]. Only a minority of patients had cardiological investigations which were more likely to lead to a diagnosis of the cause of syncope. The exact consequences of this inadequate management in terms of morbidity and mortality remains unknown, but is probably not negligible.

Implications

This study, although restricted to one hospital, probably reflects the current practice of most of the hospitals in developed countries. Improvement in the diagnosis and management of patients with syncope is dependent on precise guidelines and on their widespread distribution, not only to cardiologists but to every physician in charge of such patients, as in the OESIL study which has demonstrated the usefulness of such a protocol[13]. Dissemination of the guidelines recently written by a task force of the European Society of Cardiology on emergency and other departments in charge of patients with syncope could be a major move towards better management of such patients. The most important message, although well known by neurologists, is that a syncopal episode is rarely due to neurological causes. This simple advice could dramatically limit unnecessary cerebral scanning and use of electroencephalography.

Conclusions

Although frequent and considered as a serious symptom syncope is often misdiagnosed. Guidelines on simple and precise management should be published and used by all physicians in charge of patients with syncope.

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