Neurol Sci (2004) 25:S187–S189
DOI 10.1007/s10072-004-0282-8

E. Agostoni • P. Santoro • R. Frigerio • M. Frigo • E. Beghi • C. Ferrarese

Management of headache in emergency room

Abstract Headache is one of the most common symptoms that leads patients to the emergency room (ER) and is often related to diseases requiring prompt diagnosis and immediate treatment. This consideration brought us to consider the importance of the neurologist in improving the management of patients arriving in the ER with headache. We carried out a study for testing the degree of agreement between ER physician and neurologist using patient evaluation at headache centre (HC) as the gold standard. One hundred and seventeen patients with idiopathic (78) or symptomatic (39) headache were evaluated by the ER physician, the ER neurologist and the HC expert. The ER physician and the HC expert reached a fair agreement (Kappa=0.40); the other two pairs reached a moderate agreement (Kappa=0.57–0.60). There was no significant difference in the agreement of the three evaluators in patients with impairment of daily living activities or aged over 40. The agreement between the ER physician and the neurologist was lower (Kappa=0.58), especially in patients with their first headache episode. Based on our results, patients seen at the ER for a headache episode can be fairly successfully managed by the ER physician, except those who present a first attack, for whom neurological consultation is needed.

Key words Headache • Emergency room • Diagnosis

E. Agostoni (✉) • P. Santoro • R. Frigerio • M. Frigo
E. Beghi • C. Ferrarese
Stroke Unit, Centro Cefalee, Clinica Neurologica
Università degli Studi Milano Bicocca, Ospedale San Gerardo
Via Donizetti 106, I-20052 Monza (MI), Italy
e-mail: e.agostoni@libero.it

Introduction

The prevalence of headache in the emergency room (ER) is about 1–2% [1–5] and is considered the most common clinical condition that leads patients to the ER. Headache is a symptom related to many diseases requiring prompt diagnosis and immediate management (like subarachnoid haemorrhage, tumour and cerebral infections). A correct diagnosis is then necessary for early management and for the optimisation of ER medical activities, with consequent cost-saving. The neurologist is considered the main protagonist for a correct diagnosis of the aetiology of headache, but he may not always be part of the medical staff of the ER. Moreover, definite data in the literature showing the value of neurological assessment and the correctness of the aetiological diagnosis by neurologists in ER are missing. For these reasons we wanted to assess: (1) the reliability of the diagnosis of headache as made by different physicians working in the ER, according to simplified categories; and (2) the validity of the diagnosis comparing ER physician and ER neurologist evaluations with that of a headache expert, considered to be the gold standard.

Materials and methods

The study included patients presenting in the ER with headache as their major symptom from June 2000 to January 2001. We included patients over 17, able to give written consent and to fill a self-administered questionnaire, including demographic and clinical data. Information was obtained about the frequency, severity and duration of pain, its timing (first *vs*. repeated episode), the related disability, the presence of relevant comorbidities and the modality of transport to the ER (i.e., ambulance or other means). For each patient, the ER physician collected the history and reported the clinical findings and the ER diagnostic work-up in a separate form in which he/she was also asked to make a diagnosis, expressed in simple categories (idiopathic *vs*. symptomatic headache *vs*. headache of

uncertain origin). Using a separate form having a similar format, the neurologist in charge was also asked to record his/her consultation, to indicate any diagnostic test he/she might have requested, and to make the headache diagnosis according to the above-mentioned simplified categories. Every patient was then invited at no charge to return to a preplanned outpatient visit at the hospital headache centre (HC), were a board-certified expert in headache and related disorders (HC expert) reported his/her consultation in a separate form including a definite diagnosis, expressed in detail and in one of the above simplified categories. The diagnosis made at HC was made with reference to the International Headache Society criteria [6] and was selected as the gold standard. Each investigator was asked to evaluate the patient as in everyday practice and to formulate the diagnosis at the end of the diagnostic work-up, which was carried out in the ER for the ER physician and neurologist and at the end of the preplanned visit for the HC expert. Each investigator had no access at any time to the form filled by the other investigators. The data were processed and analysed using the statistical package SPSS-11.0 for PC. Using the Kappa statistic [7], inter-rater agreement was calculated for all patients visited by the three investigators and for sub-groups, defined by age older than 40 years, presence of a first headache episode, complete interference with daily living activities and ambulance transport. In accordance to Landis and Koch [8], agreement was deemed poor (Kappa<0), slight (Kappa=0.00–0.20), fair (Kappa=0.21–0.40), moderate (Kappa=0.41–0.60), substantial (Kappa=0.61–0.80) and almost perfect (Kappa=0.81–1.00). The study was approved by the Institutional Review Board of the hospital.

Results

We evaluated 346 patients, 117 (33.8%) of whom were examined by all investigators and were elected for inclusion in the present study. Included and excluded patients were fairly similar with reference to the demographic features and the main clinical characteristics.

The commonest clinical conditions were migraine without aura and vascular (hypertensive) headache. Of the 117 patients eligible for this study, the percent diagnosed as idiopathic headache was 62.4% for the ER physician and 71.8% for the ER neurologist. Patients with symptomatic headache were 25.6% for the ER neurologist and 29.1% for the ER physician. In addition, headache of uncertain origin was diagnosed in 8.5% of patients by ER physicians and in 2.6% by ER neurologists. In the whole sample, agreement was fair between the ER physician and the HC expert (Kappa=0.40) and moderate for the other two pairs (Kappa=0.57 and 0.60). In patients with a first headache episode agreement was moderate between the ER physician and ER neurologist (Kappa=0.58) but it was fair between the ER and HC neurologist (Kappa=0.24). This latter finding was the indicator of the lowest inter-rater agreement. In patients with complete impairment of daily living activities, agreement was moderate between the ER physician and HC expert (Kappa=0.51) and substantial for the other two pairs (Kappa=0.65). The ER physician and neurologist had a substantial agreement for patients aged >40 years, although both investigators had a less satisfactory (fair and moderate) agreement with the HC expert. The best agreement was found for patients arriving to the ER by ambulance (Kappa=0.78). In this latter (albeit small) group, agreement was substantial between ER physician and neurologist and between neurologist and HC expert. With few exceptions, agreement was most satisfactory between the ER neurologist and HC expert and least satisfactory between the ER physician and HC expert.

Discussion

We found that the ER physician, ER neurologist and HC expert can make a diagnosis of symptomatic headache in fairly similar proportions. As the diagnosis made by the HC expert was selected as the gold standard, this finding may be interpreted as the evidence of a fairly satisfactory diagnostic assessment by the ER physician, expressed as symptomatic *vs.* idiopathic headache, with a modest diagnostic gain after neurological consultation. Inter-rater agreement was best between the two study neurologists in most cases. However this was not true for older patients and for those seen at their first headache episode; in these cases the best agreement was found between the two ER investigators. This finding may be subject to different interpretations. First of all, the setting in which ER physicians and ER neurologists were working was similar and different from that of the HC expert. This might have forced them to concord on the discharge diagnosis more commonly than actually done by the gold standard. Second, older age and having a first headache episode is in itself sufficient reason for a physician to suspect an underlying clinical condition as a cause of headache, especially in patients with selected comorbid conditions, like head trauma or arterial hypertension (which were fairly common in our sample). These same conditions may have appeared less relevant at the time of the visit at the HC. Third, given the small numbers and the fairly similar figures, the possibility of chance findings cannot be excluded. Assuming that a measure of correctness of the diagnosis made by the ER physician lies in its concordance with the HC expert, a correct diagnosis was best made in patients arriving to the ER by ambulance and in those with headache heavily interfering with daily living activities. These two features may be a hallmark of disease severity [9, 10] and help the ER physician in making a correct diagnosis of symptomatic *vs.* idiopathic headache through a more intensive work-up. The study has several limitations. First of all, the assessment of inter-rater agreement was made in a sub-group of patients which included only subjects with complete information. Although the general characteristics of these patients were comparable to those of the rest of the overall ER population, selection bias cannot be entirely excluded. Second, this was a single-centre survey conducted in a university hospital, and our results may not necessarily be applicable to different hos-

pital settings. Third, the aetiologic diagnoses were arbitrarily simplified into idiopathic and symptomatic. For this reason, and because of the sample size, we cannot estimate the correctness and the homogeneity of more precise diagnostic categories (i.e., vascular, traumatic headache, etc.). Fourth, the diagnoses were collapsed into dichotomic categories (obtained after pooling into a single group patients with symptomatic headache with those in whom diagnosis was uncertain). This decision can be contended. However, the cases in which the diagnosis was uncertain were 8.5% for the ER physician and only 2.6% for the ER neurologist. In addition, it can be accepted that a patient with headache of uncertain aetiology is managed as a patient with presumed symptomatic headache and subjected to the same diagnostic work-up. Our conclusion can be summarised as follows: the ER physician is an important figure in the ER and he/she can fairly successfully manage patients arriving for an episode of headache. Neurologists can give a significant additional contribution for patients arriving in the ER for a first episode of headache. However, our data suggest that the neurological consultation is deemed necessary for a correct diagnosis and prompt management with consequent cost-saving. We believe in the importance of further prospective multicentric studies, which could improve the agreement between neurologists and physicians in the ER. Moreover, we recommend the promotion of training courses for ER physicians as to better define the problems related to management of headache in the ER.

References

1. Barton CV (1994) Evaluation and treatment of headache patients in the emergency department: a survey. Headache 34:91–94
2. Dhopesh V, Anwar R, Herring C (1979) A retrospective assessment of emergency department patients with complaint of headache. Headache 19:37–42
3. Frediani F, Cavazzuti L (1995) Le cefalee. Pronto Soccorso Nuovo 13–15
4. Freitag FG, Diamond M (1991) Emergency treatment of headache. Med Clin North Am 75:749–761
5. Leitch MJ (1980) Non-traumatic headache in the emergency department. Ann Emerg Med 9:404–409
6. Headache Classification Committee of the International Headache Society (1988) Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. Cephalalgia 8[Suppl 7]:1–96
7. Cohen J (1960) A coefficient of agreement for nominal scales. Educ Psychol Meas 20:37–46
8. Landis JR, Koch G (1977) The measurement of observer agreement for categorical data. Biometrics 33:159–174
9. Morgenstern LB (2001) Headache in the ED. Headache 41:537–541
10. Nemer JA, Tallick SA, O'Connor RE, Reese CL (1998) Emergency medical services transport of patients with headache: mode of arrival may indicate serious etiology. Prehosp Emerg Care 2:304–307