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Management of febrile convulsion: scene in a regional hospital

一所地區醫院處理發熱性抽搐病例的情況

Objective. To determine whether practice parameters are applied to the management of children with febrile convulsion.
Design. Retrospective study.
Setting. Paediatric department of a public hospital, Hong Kong.
Methods. Practice parameters of the American Academy of Pediatrics and audit measures recommended by the Joint Working Group of the Research Unit of the Royal College of Physicians and the British Paediatric Association were employed as standards. Records between January and April 2000 with the diagnostic coding of febrile convulsion, convulsion, status epilepticus, or meningitis/encephalitis/encephalopathy were reviewed. Areas assessed were appropriate documentation of hospital records and unit statistics (adverse outcomes, inappropriate investigations and treatment).
Results. Ninety-four consecutive records were evaluated. In the documentation of hospital notes, accurate description of seizure was observed in 92%, incorrect diagnosis or coding in 12%, and presence/absence of signs of meningitis and parental counselling documented in 64% and 85%, respectively. Regarding unit statistics, investigations performed included a complete blood count, blood glucose, serum calcium, serum electrolytes, renal function tests, liver function tests, chest X-ray, and urinalysis. The mean number of routine investigations was seven. The average length of stay was 2 days. There were no cases of delay in the diagnosis of central nervous system infection. Inappropriate investigations and treatment were as follows: electroencephalography 11%, computed tomography brain scan 2%, and maintenance anticonvulsants 2%. All patients were discharged home with panadol regardless of clinical state.
Conclusions. The present study showed that the use of unnecessary investigations was common. Investigations, though resulting in significant expense, proved to be of little diagnostic value. Diagnostic procedures should be performed only when specifically called for by the patient's condition or medical history.

目的：研究診治參數是否適用於處理發熱性抽搐。
設計：回顧研究。
安排：香港一所公立醫院的兒科部門。
方法：本研究採用美國兒科學會的診治參數、英國皇家醫學院研究部與英國兒科學會聯合工作小組建議的審計辦法為標準，檢視2000年1月至4月期間，診斷分類為發熱性抽搐、抽搐、癲癇持續發作，或腦膜炎/腦炎/腦病患者的病歷紀錄。評估範圍包括適當的醫院紀錄文件和部門統計數據(包括不良後果、不適當的檢查和治理)。
結果：本研究共檢視了連續94個病例的紀錄。紀錄文件中，92%準確記錄癲癇發作，12%記錄了錯誤的診斷或分類，64%記錄了病人有否出現腦膜炎徵狀，85%記錄了有否為病人家長進行輔導。從部門統計數據可見，為病者所作的身體檢查包括完整的血細胞數，血糖、血清鈣、血清電解質，腎功能和肝功能的各種測試，胸X射線檢查，以及尿液分析。例行檢查的中位數為7，平均留院時間為兩天，中樞神經系統感染的診斷沒有延誤個案。至於不適當的身體檢查和治理的病例分佈則為：腦電描記術佔11%，電腦斷層腦掃描佔2%，維持施用抗癲癇劑佔2%。無論臨床狀況如何，所有病人都獲准離院並獲配發必理痛。
結論：本研究發現，進行不必要的檢查相當普遍；這不但帶來龐大的開支，而且這些檢查本身對協助診斷作用有限。醫生應該視乎個別病者當時的身體情況或其病史，有需要時才進行檢查。

Key words:
Medical audit;
Seizures, febrile

關鍵詞：
醫學審計；
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Introduction

Febrile convulsion (FC) is the most common neurological disorder in the paediatric population. Between the age of 4 months and 5 years, 2% to 4% of all children will have at least one FC.[1,2] The seizures are of considerable concern to parents, but do not cause brain damage.[3-5] While recurrent FCs occur in one third to one quarter of children, epilepsy develops in only 2% of children overall by the age of 7 years.[1,2] The subject has been extensively reviewed in the recent medical literature. Practice parameters for managing children with FC have also been developed.[6,7] However, literature concerning medical audit of the management of FC remains scarce. The aim of the present study was to evaluate the care of children with FC seen at Tuen Mun Hospital, using some of the audit measures suggested in the literature.

Methods

Hospital records between January and April 2000 with the diagnostic coding of FC, convulsion, status epilepticus, or meningitis/encephalitis/encephalopathy were reviewed. Medical records identified with incorrect diagnostic coding were analysed after re-coding. Practice parameters of the American Academy of Pediatrics (AAP) and audit measures suggested by the Joint Working Group of the Research Unit of the Royal College of Physicians and the British Paediatric Association were employed.[6-8] Areas assessed were the appropriate documentation of hospital records, and unit statistics, including adverse outcome, inappropriate investigations and treatment. Febrile convulsion is defined by the International League Against Epilepsy as a seizure in association with a febrile illness, in the absence of central nervous system (CNS) infection or acute electrolyte imbalance, in children older than 1 month, without a history of prior afebrile seizures. The febrile illness must include a body temperature of greater than 38.4°C. The children may have normal neurological status or have neurological abnormalities. No specific upper age limit is specified. A febrile seizure is considered complex if it is prolonged, focal, or multiple.[9] The practice parameters provide recommendations for the management of children who are neurologically healthy, aged between 6 months and 5 years, and who have had one or more simple FC.

Results

Ninety-four hospital records were evaluated. Of these, 74 cases had a diagnosis of FC, seven had epilepsy with breakthrough attacks, and 13 had cryptogenic seizures. Incorrect diagnostic coding was noted in 12 (12.8%).

Profile of febrile convulsion

Among those cases with FC, 63 (85%) convulsions were simple and 11 (15%) were complex. Recurrent FC was observed in 39%. Patient age ranged from 0.8 to 5 years. Generalised seizure types accounted for 97% of the cases. A duration of seizure longer than 15 minutes was noted in 4%. Multiple attacks within 24 hours of febrile illness were observed in 12%. Fever detected after the seizure episode was noted in 7% of children. A family history of FC was present in 20% of the cases reviewed. Age of seizure onset peaked at 1 year (mean, 1.5 years; standard deviation, 0.85 years). Sixty-eight (92%) of the children had normal neurological status. The cause of fever was identified in 99% of cases—upper respiratory tract infection in 68 patients, otitis media in four patients, and urinary tract infection in one patient.

Table 1. Medical audit of management of febrile convulsion in the study population

Hospital records/unit statistics	Percent
Hospital records of the individual case	
The case notes contain:	
1. An accurate description of the convulsion, including its duration	92
2. Information about the nature of the episode	100
3. A record about the family history with regard to febrile and afebrile seizures	91
4. Age at first seizure	100
5. Temperature on admission	100
6. Whether signs of meningitis were present or absent	64
7. The child's neurodevelopmental state	93
8. Parental counselling	85
Unit statistics	
Adverse outcomes	
Delay in diagnosing meningitis/encephalitis/encephalopathy	0
Inappropriate investigations and treatment	
1. Electroencephalogram	11
2. Computed tomography brain scan	2
3. Maintenance anticonvulsant treatment	2
4. Serum urea and electrolyte estimations	90
5. Serum calcium estimation	90
6. Scheduled intermittent antipyretics irrespective of body temperature	69

Documentation of hospital records

Data on the quality of clinical information recorded for cases of FC are described in Table 1. Accurate description of seizure was observed in 92%, while only 64% of records had information about the presence/absence of signs of meningitis documented. Advice given to parents concerning prognosis and management of FC was recorded in 85% of records. All case records contained age at first seizure and body temperature on admission.

Unit statistics

Investigations and treatment provided for children with FC are shown in Table 2. A total of 460 investigations were performed. The mean number of investigations performed per patient was seven. Inappropriate requests for electroencephalography (EEG) and computed tomography (CT) brain scan were noted in 11% and 2% of patients, respectively (Table 1). Computed tomography brain scanning performed for the evaluation of complex FC or in the presence of a neurological abnormality was not considered inappropriate. Only CT scans performed for the evaluation of simple FC were considered unnecessary, whereas EEG performed for evaluation of FC, either simple

Table 2. Investigations and treatment provided for children seen with febrile convulsion

Investigations and treatment	Cases No. (%)
Investigations	
Complete blood count	73 (99)
Urea and creatinine	72 (97)
Serum electrolytes	72 (97)
Blood glucose	69 (93)
Liver function tests	63 (85)
Blood culture	19 (26)
Urinalysis	43 (58)
Electroencephalogram	8 (11)
Computed tomography brain scan	5 (7)
Lumbar puncture	1 (1)
Treatment	
Scheduled antipyretics	51 (69)
Benzodiazepine	5 (7)
Maintenance anticonvulsants	1 (1)

or complex, was considered unnecessary. All children who underwent either EEG or CT brain scan were assessed as having normal neurological status. Computed tomography brain scanning was performed inappropriately for two children with simple FC. Among the eight children who underwent EEG, the findings were normal in 75% and non-specific in 25%. Electroencephalography was performed for evaluation of seizure in five children with complex FC. Lumbar puncture was performed in one patient with complex febrile seizure. There were no occurrences of delayed diagnosis of meningitis/encephalitis/encephalopathy. Sixty-nine percent of children were given scheduled intermittent antipyretics every 4 to 6 hours, regardless of body temperature. One third of children received antibiotics for their febrile illness. Benzodiazepine was given in 8% of children to stop the convulsion, while one child required additional phenobarbitone and phenytoin. Only one patient with simple FC was discharged with maintenance anticonvulsant therapy. The average length of stay in hospital was 2 days.

Discussion

This pilot study is the first of its kind in the Hong Kong Chinese population, assessing the management of FC at a regional hospital. It demonstrates that despite clear practice parameters, unnecessary investigations and treatment remain common. Better documentation of the presence or absence of signs of meningitis, and parental counselling on FC was noted to be required.

Routine blood investigations (complete blood count, blood glucose, electrolytes, urea, and creatinine) were completed for over 90% of cases. On the basis of published evidence, the AAP recommended that routine blood studies were of no benefit in the evaluation of patients with simple FC. Blood glucose determination should be obtained if the child has a prolonged seizure. A complete blood count may be useful in the evaluation of fever, particularly in younger children. Appropriate history taking and physical examination enables identification of children who are dehydrated and have abnormal serum electrolyte values.[6]

About one tenth of the patients, with 62% suffering from complex FC, had EEG performed. Electroencephalography provided no additional information for the management of these children. We view EEG for the evaluation of FC as inappropriate. There is no evidence suggesting that abnormal EEGs after the first FC are predictive for the risk of recurrence, or development of epilepsy.[10,11] The AAP asserts that EEG should not be performed in the evaluation of children with simple FC.[6] Maytal et al[12] completed an analysis of EEGs for children with complex febrile seizures and concluded that the routine practice of obtaining an EEG for children with complex FC was not justified.

The consensus on the basis of the available evidence is that neuroimaging should not be performed in the routine evaluation of the child with a first, simple FC.[6] Only 2% of the children with simple FC seen at Tuen Mun Hospital had an emergency CT brain scan performed. Computed tomography brain scan results were normal in these children with either simple or complex FC. This observation is in accordance with that of a retrospective analysis of 107 neurologically normal children who underwent neuroimaging when they first presented with a possible first seizure.[13] The authors reported that seizure in the setting of fever rarely indicates the presence of an unexpected CT scan lesion requiring intervention.

Since fever is an essential ingredient in the genesis of FC, it is tempting to assume that vigorous use of antipyretics would prevent recurrence. A Finnish study randomised 180 children with a first FC to receive acetaminophen or placebo to test this hypothesis. The recurrence rate was identical for both groups.[14] A randomised placebo-controlled trial conducted in the Netherlands demonstrated that the 2-year FC recurrence rate was similar in children who received placebo or ibuprofen.[15] The common practice at Tuen Mun Hospital of scheduled intermittent antipyretic use, irrespective of body temperature, appears unjustified. However, antipyretics are useful in decreasing patients' discomfort and can be considered on an individual basis.

Maintenance anticonvulsants were not widely used in the management of children seen with FC. The only patient given maintenance anticonvulsants in the present survey was a boy with recurrent FC. The medication was given to address parental anxiety. The 'best medicine' in such cases is to sit and talk with the family.[1,16] Parent reassurance is the most important aspect of management. Febrile convulsion is benign, and although there are effective therapies that could prevent recurrence, the potential adverse effects of drug therapy outweigh the potential benefits.[7] There is no convincing evidence that any therapy can alleviate the future development of epilepsy. Intermittent use of oral benzodiazepines at the time of fever has been reported to result in a 44% reduction of recurrence of FC per person-year.[17] However, seizures may have occurred before the fever is noticed. In addition, the sedative effects of the drug could mask signs of CNS infection. Benzodiazepines can be used

when FC results in severe parental anxiety, and to reduce the risk of prolonged seizures.[7,17]

The present survey highlighted that children with FC were often extensively and unnecessarily investigated. Though resulting in a significant expense, routine investigations proved to be of little diagnostic value. The need for antipyretics and an overnight stay is questioned for this benign condition. This study also suggests that we could improve patient management by better documentation, especially concerning parental counselling.

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