Aetiology of cerebral oedema in diabetic ketoacidosis

The excellent evidence based review of the emergency management of diabetic ketoacidosis (DKA) in adults by Hardern and Quinn perpetuates the premise that “unnecessarily large volumes of intravenous fluids should be avoided because of the high case fatality rate of cerebral oedema”. This presupposes that the rate of fluid delivery is causally related to the development of cerebral oedema, which has not been proved. The large 15 year paediatric study in the USA that analysed 6977 hospitalisations for DKA found among the 61 cases of cerebral oedema (0.9%) that after multiple logistic-regression analysis with random and matched controls, the only variables statistically associated with cerebral oedema were higher initial serum urea nitrogen concentrations and lower partial pressures of carbon dioxide at presentation. In addition, smaller increases in serum sodium concentration during treatment and the use of bicarbonate were also implicated. Importantly, the rate of fluid, sodium, and insulin administration were not associated with the development of cerebral oedema, nor was the initial serum glucose or its rate of change.

Clearly these findings relate to patients aged 18 years or less but most occurrences of cerebral oedema in DKA are in children and adolescents, with only rare cases in adults. However, the underlying aetiology should be no different. One unifying hypothesis is that the cerebral oedema is related to cerebral vasoconstriction, brain ischaemia, and hypoxia, as hypcapnoea causing cerebral vasoconstriction and extreme dehydration would both decrease cerebral perfusion. In addition, as children’s brains have higher oxygen requirements than adults this may explain their unique susceptibility.

Perhaps clinicians should focus more on recognising the warning signs of cerebral oedema such as headache, lethargy, and deterioration in conscious level, prior to seizures, incontinence, pupillary changes, bradycardia, and respiratory arrest as brain stem herniation occurs. Early hyperosmolar treatment and presumably supplemental oxygen with exemplary supportive care would then be no different. One unifying hypothesis is that cerebral oedema may well be idiiosyncratic rather than iatrogenic could have important medicolegal connotations too.

A F T Brown
Department of Emergency Medicine, Royal Brisbane Hospital, Herston, Brisbane, Queensland 4029, Australia; af.brown@uq.edu.au
Glucagon use in symptomatic β blocker overdose

I was interested to read the best BET “Glucagon for the treatment of symptomatic β blocker overdose” by Boyd and Ghosh.¹ As the authors recognised, the six studies tabulated were of mixed overdose or had multiple therapeutic interventions and could not answer the question posed. However, had the search strategy included individual drug names (for example, propranolol, atenolol) more relevant papers would have been found, including two cases of pure β blocker overdose successfully treated with glucagon alone.² ³ The evidence for glucagon in treating symptomatic β blocker overdose will probably never reach a higher level than case reports. This is true of most “antidotes” because of the constraints on toxicology studies. Glucagon, however, has been shown to be effective in treating symptomatic β blocker overdose in various controlled animal studies. About 20 deaths per year in the UK are attributed to β blocker overdose. The authors state that glucagon is expensive. It is true that large doses may be required and that this may outweigh hospital supplies. However, at an initial dose of 5–10 mg (100 μg/kg) intravenously at £19.95/mg, the cost² compares favourably with thrombolytic as a potential lifesaving intervention. Atropine has been shown to be spectacularly ineffective in this setting and alternatives such as β agonists, phospho-diesterase inhibitors, insulin-euglycaemia, and pacing have significantly more associated complications than glucagon without improving outcome.

Glucagon treatment for symptomatic β blocker overdose should not yet be discarded on grounds of cost or lack of evidence.

J Lee

Accident and Emergency Department, Leeds General Infirmary, Leeds LS1 3EX, UK; docjasontlee@hotmail.com

References


Emergency management of contact lens associated corneal abrasions

Corneal abrasions in contact lens wearers may have sight threatening consequences. Contact lenses can compromise the corneal epithelium and act as pathogenic vectors, facilitating the development of bacterial keratitis. Most corneal abrasions heal quickly when treated with topical antibiotics, which act as lubricants and antimicrobial agents. However, in contact lens wearers there may be rapid progression to corneal scarring or even perforation.

Two patients with contact lens related corneal abrasions, who were initially treated with topical fusidic acid or chloramphenicol, have presented with corneal stromal abscesses. The abscesses developed 12 hours and three days respectively after diagnosis of simple corneal abrasion. Visual acuity was perception of light and hand movements. Both required admission for intensive topical fortified gentamicin and guttae cephalosporin.

Pseudomonas aeruginosa and Proteus were grown, which were resistant to chloramphenicol and fusidic acid. Both required intensive care. An initial dose of 5–10 mg (100 μg/kg) was therefore given. The head of the injections; one patient has proceeded to corneal grafting.

A 15 year study of resistance in bacterial isolates from corneal scrapings found that 30.4% of isolates were resistant to chloramphenicol⁴ (54% of Gram negative organisms), with a significant increase in resistance during this period. Once microbial keratitis is established, a combination of topical fortified aminoglycoside and cephalosporin or fluoroquinolone is indicated⁵; no trend for increasing resistance to these antibiotics was observed in the aforementioned study.

Contact lenses are the most important risk factor for the development of bacterial keratitis. In the emergency department, a history of contact lens wear should be sought, with urgent review of worsening abrasions. We advise that all contact lens related red eyes should be referred to the ophthalmology department, as clinical signs may initially be subtle and corneal scraping may be warranted. Time of commencement of guttae toluidinum with the first sign of infection, may greatly reduce the chance of poor outcome.

Contributors

Sharon Higgs treated the second patient, reviewed the literature and wrote the paper. Jeffrey Kwartz treated both patients and contributed to the discussion of core ideas. He was the supervisor and is the guarantor.

S M Quinn, J Kwartz

Department of Ophthalmology, Royal Bolton Hospital, Bolton, UK

Correspondence to: Ms S Quinn, Department of Ophthalmology, Royal Bolton Hospital, Parnworth, Bolton BL4 0JR, UK; shaunaquinn@hotmail.com

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References


BOOK REVIEWS

Radiology for anaesthesia and intensive care


This book is clearly aimed at anaesthetists preparing to sit the FRCA examination. Any doubt regarding this is quickly dispelled by the two chapters that follow the introduction: “About the FRCA Examination” and “The Pre-Operative Assessment”. Hardly surprising, therefore, that it is of limited relevance to emergency medicine.

Each of the book’s seven main chapters begins with a general introduction to set the scene and introduce underlying concepts, before moving on to a series of realistic “case illustrations”, in question and answer format, accompanied by an explanation and additional background information. This is a clear and effective layout, but because the whole case is often presented on a single page it is sometimes a little too easy to read the answer before the question, or perhaps I’m just a natural cheat.

There are, however, some useful sections. I found the chapter on imaging the chest, particularly in relation to chest radiological interpretation, interesting and educational, but the abdominal section was too heavily weighted towards computed tomography and contrast studies to be of substantial use.

A sizeable section of the book is dedicated to trauma radiology, but while the chapter on the cervical spine is informative and up to date, that on chest and abdominal trauma covers management at a basic level, with little imaging of interest.

As emergency physicians take on a greater role in the management of head injury, and computed tomography becomes more widely available, I find myself interpreting more and more head scans. For this reason, I thought that the chapter on computed tomography of the head was probably the best in the book. It makes a good introduction to those who are approaching this subject for the first time, and the excellent scans, clearly described with useful clinical detail. There is also a short final chapter on ultrasound in intensive care units, which overlaps considerably with the recent development of “FAST” scanning in the emergency department. I am doubtful, however, that a textbook can teach more than the basic principles underlying such an essentially dynamic skill.

For those about to sit the MFAEM or FFAEM exams there is some useful information in this book, but probably not sufficient to justify the purchase price. The two major problems are the inevitable anaesthetic slant, and the limitations of the medium itself. This anaesthetic slant is constantly manifest in the presentation of cases that are particularly relevant to anaesthesia (lots of rheumatoid arthritis, for example), followed by questions such as “are there any precautions necessary prior to anaesthesia?” Some might argue that with the increasing performance of intubation by emergency physicians these questions are now becoming more relevant, but on the other hand detailed imaging is a rare luxury before rapid sequence induction in our departments.
Sudden death and the myth of CPR


Most emergency physicians will sometimes recognise a feeling of futility during cardio-pulmonary resuscitation (CPR)—the algorithm is followed despite the fact that most of those present know the attempt is doomed to failure, or frankly inappropriate.

Stefan Timmermans is a Belgian healthcare sociologist who spent time in American emergency departments observing the rituals surrounding CPR. His book questions the notion of CPR for all, and the over-optimistic progression of survival from out of hospital cardiac arrest that is portrayed in the media, and by some medical authorities. The book describes the attitudes and feelings of doctors, nurses, and paramedics, their definitions of good and bad resuscitation attempts, and the way in which they feel constrained by guidelines and lawyers.

The chapters are wide ranging and include the evolution of resuscitation techniques, death awareness, and what constitutes a “good” death, as well as discussion on advance directives and the presence of relatives during resuscitation attempts. The author divides resuscitation attempts into four distinct categories: survival from out of hospital cardiac arrest that is portrayed in the media, and by some medical authorities. The book describes the attitudes and feelings of doctors, nurses, and paramedics, their definitions of good and bad resuscitation attempts, and the way in which they feel constrained by guidelines and lawyers.

Upwards of two million children will attend accident and emergency departments in the United Kingdom every year. Many thousands more will attend general practice for advice or treatment after acute illness or injury. Large numbers of practitioners in many different settings therefore need to be prepared to deal with children with a variety of urgent and emergency conditions. As an old Chinese proverb states “Small children do not pretend to be sick.” The problem is that the vast majority of children have minor to moderate illness, much of which is self limiting. Indeed many of the injured children require little more than symptomatic relief and general supportive care.

The problem therefore is identifying the wheat from the chaff. In other words, how does one identify the critically ill child, or the child who is seriousness? Age and experience help. Certainly knowledge is useful. More often the wisdom of Solomon is required. There is no doubt that experience brings greater wisdom, and with it ability to deal with children effectively. I suppose that is really what I like about this book. The authors have brought their collective experience and wisdom, gathered over the years (I am not brave enough to state how many, but I know it is considerable!) to produce an extremely readable text that is well laid out and well presented. The salient features are highlighted in boxes and the use of diagrams is good. Personally I would have liked to have seen more radiographs and clinical pictures, but then again this may not be the purpose of a handbook. This may best be left to a colour atlas, or better still, clinical practice. Computed tomograms of the head are poorly produced and this is again disappointing.

This book covers virtually all the salient features of paediatric emergency medicine. There are no glaring omissions, although one always has pet subjects one would wish to see incorporated. It would be churlish to let these personal idiosyncrasies detract from the overall good feel I have for this text.

There is no doubt that this book will provide useful reading at all levels of experience. Reading it and being familiar with the contents will bring greater knowledge. Wisdom, I’m afraid will have to come with time. The only major problem with this book is that it is a bulky, heavy hardback. As such it won’t fit into a pocket conveniently and may well end up on the shelf. By being left on the shelf it runs the risk of being ignored and this, I think, would be a tragedy.

Martin Luther King would be proud of this effort.

J R Benger

Handbook of paediatric emergency medicine


Knowledge is a process of piling up facts; wisdom lies in their simplification. Martin Luther King, Jr (1929–1968)

In 230 pages and a few monochrome illustrations this paperback covers the top 20 clinical problems that are stocked in every intensive care unit. The authorship is a reassuring collection of UK intensivists, who’s who? of the Intensive Care Society. I liked the standardised format; case histories are folies to the book main interest with reference to pathophysiology, treatment options, and outcome. A panel of key learning points rounds off each chapter, and the recommended further reading is appropriate and proportionate.

A number of the cases bear upon emergency care and many are set in the resuscitation room. The importance of securing the ABCs is emphasised before discussion of theoretical concepts, not always the case in books of this sort. This reflects the interests of the authors, many of whom are active in education at the interface between intensive care and emergency medicine. Relevant cases include burns, trauma, and overdoes, but periyxia is included uncomfortably in the chapter on status epilepticus. The chapters are up to date; the roles of inhaled nitric oxide and prostacyclin in ARDS are set out. And there is a review of the evidence on non-invasive ventilation in COPD. Activated protein C is (to this reviewer at least) a very new treatment in septic shock, and its brief role is testament to the book’s temporary quality. The Swan Ganz catheter is placed in its correct context, alongside alternatives including the pulse induced continuous cardiac output monitor. I was also pleased to see the role of corticosteroids laid out in accordance with current thinking on the treatment of sepsis.

This reviewer has an aversion to diagrammatic representation of pulmonary physiology, lung capacities, closing volumes, and zones of perfusion. The authors avoid such esoteric concepts, and there is no assumption of knowledge of molecular biology in the chapter on sepsis and multiple organ failure. Cardiac care is the major omission from what is otherwise a reasonably broad based content.

Trainees in intensive care medicine from all parent specialties will find this a useful and accessible resource. It sets out to present a consensus approach to common clinical problems, and is not a comprehensive textbook. For any specialist registrar about to start a secondment in the ICU this little book would be a good investment.

J E France

Core cases in critical care


In 230 pages and a few monochrome illustrations this paperback covers the top 20 clinical problems that are stocked in every intensive care unit. The authorship is a reassuring collection of UK intensivists, who’s who? of the Intensive Care Society. I liked the standardised format; case histories are folies to the book main interest with reference to pathophysiology, treatment options, and outcome. A panel of key learning points rounds off each chapter, and the recommended further reading is appropriate and proportionate.

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