Sonographic diagnosis of “acute abdomen” in children and adults


INTRODUCTION

The acute abdomen is the main term for an at first unclear emergency situation of the abdominal cavity. The acute abdomen belongs to the three most important reasons for the admission of patients into the emergency room. Further, this illness ranks 40 % of all consultations in the ambulant care sector. The acute abdomen requires an early and direct diagnosis because of its potential of having a life threatening differential diagnosis.

Accurate epidemiological data of the acute abdomen has not been published so far. Whereas prevalence and incidence rates of some differential diagnosis e.g. acute appendicitis, cholecystitis, pancreatitis, and mechanical small intestine ileums have shown constant falling numbers, cases of perforated ileus are in decline.

This HTA report aimed to assess the ultrasound diagnosis of the acute abdomen considering children and adults. This will be done from a medical and economical perspective. The differential diagnosis respectively the cause of the acute abdomen binds high direct treatment costs, especially in the stationary sector. Ultrasound diagnosis is a procedure that plays a big part in the differential diagnosis process and it is widely used in practise. Other research methods of diagnosing acute abdominal illness are: clinical examinations with inspection and palpation, surgical exploration and laparorcopy as well as computer tomography and x-ray examination.

OBJECTIVES

The main objective of this HTA report is to assess what significance sonography should have within the examination strategy of the acute abdomen from the medical and economical view. Second, this HTA report will evaluate under which circumstances the ultrasonographic diagnosis of the acute abdomen, considering medical and economical quality classifications, is the alternative of choice to comparable diagnostic measures.

MEDICAL ASSESSMENT

METHODS

Based on the levels of evidence and grades of recommendations by Phillips (2001), relevant publications were identified by hand-search and conducting a systematic literature search. The target population this HTA report is aimed at are children and adults with acute abdomen or embedded differential diagnosis. Hand-search was conducted inside of the known data bases of HTA institutions as well as from medical and economical journals. The following databases were searched in cooperation with the DIMDI to identify relevant literature: Biosis- Previews (BA93), Biotechnobase (ET80), Cab-Health (AZ72), Elsevier Biobase (EB94), EMBASE (EM74), Embase Alert (EA08), Ethmed (ED93), Euroethics (EU93), Gerolit (GE79), Heclinet (HN69), IHTA (HT83), IPA (IA70), MEDLINE (ME90, Medline Alert (MEOA) and SciSearch (IS74).

The search parameters were orientated by the embedded differential diagnosis’s as well as diagnostic measures considering the acute abdomen. The bibliographic search covered the period from 1990 to 2003. The relevant languages are English, German in connection to French.

The evaluation of the information has been graduated. It must be clear that the abstract follows the topic of the acute abdomen. The as such identified literature will be structured by its methodological quality and relevance. This will be analysed and later valued after it is clear that the minimum requirements are met.

RESULTS

21 publications out of the identified 560 citations conformed to the medical inclusion criteria resp. the characteristics concerning the methodological quality and transparency. Regarding the target population of adult patients, 18 publications have been evaluated. Three publications have been evaluated which stated children as the target population.

For adults, the evaluated articles confirmed consistently the sufficient diagnostic quality for ultrasound for the acute abdomen, becoming an adequate alternative to other comparable diagnostic methods and techniques. On the one hand, compulsory ultrasound can reduce the rate of false negative or false positive diagnostic findings. On the other hand, compulsory ultrasound can improve diagnostic quality and will allow an earlier differential diagnosis.
The evaluated papers of the target population ‘children’ demonstrated that sonography resp. ultrasound as the basic examination is recommended for children with acute abdominal pain.

**DISCUSSION**

All authors considered that ultrasound is a technique offering increasing knowledge in the diagnosis of the acute abdomen. The weak point stated by some authors is the high variance concerning the results’ sensitivity. This may result from a correlation between the doctors’ experience and the quality of the diagnosis. Further, the lack of blinded trials can be a problematic point. Also, the high variance of the included age-cohorts which excluded the possibility of dividing a study into the two focused target populations can be discussed critically.

Altogether, the identified and assessed publications did not account at all for the huge knowledge benefits related to the technical development of modern ultrasound and computed tomography systems. Using modern ultrasound techniques like Tissue Harmonic Imaging (THI), picture quality and detail-recognisability of pathological proceedings increased. At present, THI is used as a routine diagnostic technique in abdominal diagnosis. Furthermore, the development of smaller-sized ultrasound systems can enhance existing time advantages in life-threatening events. Therefore, today’s hospital diagnostic time needs of acute disease patterns are only seven minutes.

**ECONOMIC ASSESSMENT**

**METHODS**

The proceeding of the information retrieval and the economic assessment correspond to the stated medical assessment.

**RESULTS**

Three publications out of the identified 560 citations conformed to the economic inclusion criteria resp. the characteristics concerning the methodological quality and transparency of health economic studies.

The evaluated articles confirmed consistently that routine ultrasound is a cost-effective technique for the diagnosis of the acute abdomen which has to be complemented with other diagnostic methods regarding the existing diagnostic findings. Two articles arrived at the conclusion that ultrasound is more cost-effective than other comparable techniques. One article recommended the use of ultrasound within a structured diagnostic strategy.

**DISCUSSION**

The results out of the identified literature admitted the conclusion that sonographic diagnosis of the abdomen is a cost effective option comparing to other comparable diagnostic regimes. All referred authors came to the conclusion that sonography is a technique with high (medical) effect and lower or at least low costs. Some authors estimated in their specific studies that sonography is more cost-effective than the other compared techniques.

The scarce quantity of health economic evaluations has to be considered problematically. Further, the identified economic publications do not assess all technologies of interest with all differential diagnosis as well as the wide ranges of the peer groups included into the assessment is a critical point, where only one evaluation distinguished between the two peer groups.

Overall, the consistent results of the publications included approve the conclusion that sonography is a cost-effective basic diagnosis of the acute abdomen which has to be completed due to the examination findings by other diagnostic techniques.

**ETHICAL ASSESSMENT**

Within the limits of this HTA report, ethical of social aspects have not been identified. At least the reduction of false positive or false negative examination findings as well as the problem of unintended radiation exposure can be included into an ethical dimension. Within the identified literature we did not find any assessable results.

**RECAPITULATING DISCUSSION OF ALL RESULTS**

The acute abdomen poses a huge diagnostic challenge for the practitioner. The results of the medical and economic assessment came to the conclusion that sonography can provide significant medical benefits in a cost-effective way. For the target group children with acute abdomen, the prevention of an unintended radiation exposure is of high relevance. Here, sonography is already the diagnostic technique of choice. Within the limits of this health technology assessment, ethical of social aspects have not been identified which justified a separate assessment.
CONCLUSION

During a structured examination strategy, e.g. guidelines, sonography of children has become the diagnostic method of choice. Taking up sonography as a primary diagnostic evaluation into the guidelines of the analysis of the considered literature is recommended. The usage of already existing ultrasound systems is also recommended.

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