



ESER

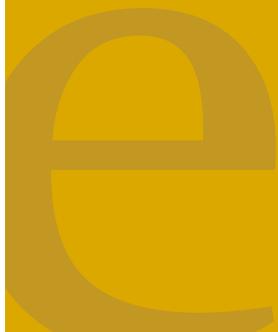
European Society of
Emergency Radiology



ESER ANNUAL SCIENTIFIC MEETING 2016

July 04-05, 2016 | Naples, IT

Course Programme



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WELCOME

Dear Colleagues and friends,

on behalf of the European Society of Emergency Radiology it is a special honour for us to invite you to the **5th Annual Scientific Meeting** of the European Society of Emergency Radiology (ESER) that will be held at the Royal Continental Hotel **in Naples, Italy on July 4-5th 2016.**

The Annual meeting will provide a broad overview of current state-of-the-art imaging techniques to evaluate the acutely ill and injured patient. The programme includes V Sessions: Neuro-trauma, Abdominal Trauma, Critical Issues in Emergency Radiology, Thoracic and Vascular and Abdominal and Pelvic Imaging, with a practical approach and case-based presentations. Actually, Radiology Residents, Clinical Radiologists, Emergency physicians and subspecialists in Emergency Radiology will find the educational and scientific material presented at the V ESER meeting essential to their core and on-call knowledge base. **A news this year is the workshop on “Acute Abdominal pain”** for 32 people in which attendees will learn how to do, how to read and how to report an exam in the emergency setting.

The additional value of the Congress is its location. Naples is one of the most beautiful cities in the world with astonishing natural beauty, the famous bay, the ruins of ancient civilizations, fashion, special food and social and cultural events. Naples' historic city centre is the largest in Europe, and is listed by UNESCO as a World Heritage Site. Finally, the Royal Continental, is located on Naples' waterfront, in the centre of the large pedestrianised island of the promenade, while still being well-connected to the rest of the city.

We wish you a very successful and enjoyable meeting in this wonderful city!

Sincerely yours,

Mariano Scaglione, MD
ESER President
on behalf of the ESER board members



MONDAY, JULY 04, 2016

- 09:45 Opening remarks**
M. Scaglione, Castel Volturno/IT
- 10:00 Workshop – Acute abdominal pain**
- 10:00 Right upper quadrant pain**
R. Basilio, Chieti/IT
- 10:30 Left lower quadrant pain**
A. Agrawal, New Delhi/IN
- 11:00 Discussion**
- 11:10 How to report**
Each group will report two cases
- 12:15 Clinical case presentations and discussion**
A. Agrawal, New Delhi/IN; R. Basilio, Chieti/IT
Each group will present their own cases
- 13:15 Break**
- 14:00 Session I – Neuro-trauma (interactive)**
Moderators: M.-F. Reiser, Munich/DE; F. Berger, Amsterdam/NL
- 14:00 Imaging maxillo-facial trauma**
A. Sorbo, Castel Volturno/IT
- 14:25 Easily missed traumatic brain injury**
G. Schueller, Opfikon/CH
- 14:50 MRI of post-traumatic intracranial hemorrhage**
F. Macri, Nimes/FR
- 15:15 Imaging of Spine trauma**
S. Vaidya, London/UK
- 15:40 Chest pain management with latest CT innovations:
Clinical algorithms drive CT protocols**
Prof. Dr. med. Ulf Teichgräber, Director of the Department of Radiology
Institute for Diagnostic and Interventional Radiology,
Universitätsklinikum Jena
U. Teichgräber will share his experience with Revolution CT in
emergency setting
- 16:00 Coffee Break**



MONDAY, JULY 04, 2016

16:25 Scientific Awardings

M.-F. Reiser, Munich/DE

16:40 Session II - Scientific Presentations

Moderators: F. Pinto, Marcianise/IT; S. Vaidya, London/UK

16:40 Volume of intraabdominal air measured by CT:

A potential marker for abdominal compartment syndrome in trauma patients?

E.C. Schubert, Munich/DE

16:48 CT performed under resuscitation using automated chest compression devices: How-to, experiences, and estimation of value in a single-centre mid-scale case study

K. Wirth, Munich/DE

16:56 Do C-reactive protein and white blood cell count guide the selection of patients for computed tomography imaging in the clinical setting of the non-traumatic acute abdomen?

E. Sanhal, Ankara/TR

17:04 Cardiovascular signs suggestive of Thoracic Compartment Syndrome (TCS) in emergency setting

C. Liguori, Naples/IT

17:12 Acute respiratory failure in emergency: Not only pulmonary embolism

F. Gentili, Siena/IT

17:30 Session III - Abdominal trauma

Moderators: R. Grassi, Naples/IT; S. Wirth, Munich/DE

17:30 Duodenal and pancreatic injuries

U. Linsenmaier, Munich/DE

17:50 Imaging of bowel and mesenteric injuries

M. Tonerini, Pisa/IT

18:10 Mistakes in abdominal trauma

F. Berger, Munich/DE



TUESDAY, JULY 05, 2016

08:00 Session IV - What experts miss 1

Moderator: S. Vaidya, London/UK

Missed traumatic injuries: Cased-based

Invited trauma experts: A. Ierardi, Varese/IT; M. Scaglione, Castel Volturno/IT, A. Tartaro, Chieti/IT

09:00 Session V - Critical issues in Emergency Radiology

Moderators: G. Gugliemi, Foggia/IT; U. Linsenmaier, Munich/DE

09:00 Imaging of terrorist attacks

S. Wirth, Munich/DE

09:30 Managing occult fractures and bone marrow oedema injuries

E. Dick, London/UK

10:05 Role of CEUS in blunt abdominal trauma

V. Miele, Rome/IT

10:30 Coffee Break

11:00 Session VI - Thoracic and Vascular

Moderators: L. Bonomo, Rome/IT; E. Dick, London/UK

11:00 Esophageal emergencies

A. Pinto, Naples/IT

11:20 Aortic disease

T. Valente, Naples/IT

11:50 Thoracic and vascular emergencies: Case-based

E. Kashef, London/UK

12:30 Break

13:30 Depiction of major traumatic liver lesions with vascular involvement using high concentration contrast medium

L. Romano, Cardarelli Hospital, Naples/IT

13:50 Dual Source in Emergency applications

I. Crippa, Italy





TUESDAY, JULY 05, 2016

- 14:00 Session VII - Abdominal and pelvic imaging**
Moderators: R. Nicola, Rochester/US; L. Romano, Naples/IT
- 14:00 Acute abdomen in oncologic patients**
M.A. Mazzei, Siena/IT
- 14:30 Bowel inflammatory disease**
A. Laghi, Latina/IT
- 15:00 US of the acute abdomen with CT and MRI correlation**
R. Nicola, Rochester/US
- 15:30 Session VIII - What experts miss 2**
Moderator: S. Romano, Naples/IT
Bowel obstruction & Ischemia cases
Invited experts: F. Danza, Rome/IT; R. Nicola, Rochester/US
- 16:30 Closing remarks**
M. Scaglione, Castel Volturno/IT



ESER 2016 ABSTRACT SYLLABUS

SCIENTIFIC ABSTRACTS

Volume of intraabdominal air measured by CT: A potential marker for abdominal compartment syndrome in trauma patients?

E.C. Schubert¹, E.J. Rummeny¹, K.G. Kanz², K. Holzapfel¹; ¹Department of Radiology, Klinikum rechts der Isar Technical University Munich (TUM), Munich, Germany; ²Department of Trauma Surgery, Klinikum rechts der Isar Technical University Munich (TUM), Munich, Germany

Purpose

Purpose of our study was to compare intraabdominal air volumes determined by CT of prehospital intubated trauma patients with those of a non-ventilated control group in order to identify patients at risk for developing abdominal compartment syndrome (ACS).

Methods and Materials

In 30 preclinically intubated polytrauma patients (CT performed at admission; mean age 49.3±7.8 years; 21 men, 9 women; ISS score over 16) and 40 non-ventilated control subjects (follow-up CT scans of non-abdominal tumor patients in complete remission; mean age 52.9±8.4 years; 29 men, 11 women) intraabdominal air volumes were determined by CT using Philips Intellispace Portal software. Mean intraabdominal air volumes of trauma and control patients were compared using the Mann-Whitney U test. In addition, patients with exceedingly high volumes of intraabdominal air, a known risk factor for developing ACS from experimental studies, were identified.

Results

Mean intraabdominal air volumes of ventilated trauma patients (420.6 ml; range 123.7-5763.3 ml) were significantly higher than of non-ventilated control subjects (272.5 ml; $p < 0.05$; range 112.2-580.6 ml). In 20% of trauma patients (and in none of the control group) air volumes exceeding 1000 ml were measured (range 1024.4-5763.3 ml), raising the intraabdominal pressure increasing the risk for developing ACS.

Conclusion

Prehospital intubation of trauma patients results in higher volumes of intraabdominal air compared to control subjects. In 20% of ventilated polytrauma cases a massive distension of stomach and bowel is observed. This may be a sign of impending ACS and can be identified by the radiologist; immediate gastric tube placement or surgical decompression should be recommended.





**CT performed under resuscitation using automated chest compression devices:
How-to, experiences, and estimation of value in a single-centre mid-scale case study**

K. Wirth, M. Reiser, S. Wirth; Institute for Clinical Radiology, Hospital of the LMU, Munich, Germany

Purpose

Multidetector-CT is widely available and allows for very fast and correct diagnoses of almost all acute life-threatening conditions. When performed as a standard protocol, Whole-Body-CT (WB-CT) saves 25% of polytrauma patient lives and is thus fixed part of the radiological diagnostic shock room service.

Despite these facts WB-CT is not established yet in the first line diagnostic process of unclear lifelessness in out-patients under resuscitation. As a consequence of the underlying nature of resuscitation conditions, no prospective trial is available and only few cases are reported. Radiological institutions are rarely but acutely confronted with such situations where usually neither standard procedures nor experience is available. The aim of this study was to sum up our cases, derive procedural recommendations and estimate the value of standardised WB-CT during resuscitation (Resc-CT).

Methods and Materials

The ongoing study was approved by the IRB. We viewed the interval from 2008 to 2015 and included 41 patients so far (62% male) with a mean age of 55 years (range 22-86). Inclusion criteria were unclear lifelessness, a resuscitation time of more than 20 minutes and the use of an automated chest compression device (CC: chest compression with LUCAS, Jolife, Sweden or AutoPulse, Zoll, Germany). We had a learning curve and began with unenhanced CT and tried several variants of intervals with temporarily paused chest compression and also differing delays following intravenous administration of contrast media.

Results

How-To Resc-CT: (1) scout with running CC, (2) unenhanced Head CT with CC paused, (3) enhanced CT of the trunk with (a) unexperienced team: 60 sec arterial and 200 sec venous standard delays or (b) experienced team: manual arterial bolus triggering in 'jumping aorta' and additional 150 sec standard delay for the venous phase.

Value: In 24% of cases lifelessness was still unclear after Resc-CT, but in 1/2 of these cases, clarification came with the result of lab values. In the other 76% portion of cases decision making was possible directly after the Resc-CT with 1/5 leading to immediate targeted therapy with almost 40% initial survival and 4/5 gave reason to stop resuscitation). However, in total only 7% of patients were long-term survivors.

Conclusion

Resc-CT is relatively easy to perform and there is 'nothing to lose'. Circulation time is massively prolonged. In cases when the scan was performed too early, just repeat it. As resuscitation is paused for the few seconds of scanning, there are absolutely no motion artefacts and image quality may be hampered by metal artefacts but is otherwise outstanding. In at least 80% 'you win' by getting the information which allows for targeted therapy or ethically justified termination of efforts. Although not proven, we expect that results may also be comparable for Resc-CT with manual chest compression.



Do C-reactive protein and white blood cell count guide the selection of patients for computed tomography imaging in the clinical setting of the non-traumatic acute abdomen?

E. Ozan¹, G.K. Atac¹, K. Alisar¹, T. Evrin², L.O. Sonmez², A. Alhan³; ¹Department of Radiology, Ufuk University Faculty of Medicine, Ankara, Turkey; ²Department of Emergency Medicine, Ufuk University Faculty of Medicine, Ankara, Turkey; ³Department of Statistics, Ufuk University Faculty of Arts and Sciences, Ankara, Turkey

Body

Acute abdominal pain represents approximately 10% of emergency department admissions worldwide. Computed tomography (CT) is a useful tool in this scenario with high diagnostic accuracy. Due to the concerns about CT radiation and emerging requirement for more economically effective utilization of CT, strategies to manage CT appropriateness have become more of an issue. Identification of the appropriate setting to perform CT in patients with acute abdominal pain, thus reducing unnecessary radiation exposure and maximizing the benefit to patient is essential.

Purpose

To evaluate whether C-reactive protein (CRP) and white blood cell (WBC) count may serve as a guide for the selection of patients for CT imaging in the clinical setting of the non-traumatic acute abdomen.

Methods and Materials

Patients presenting with symptoms of acute non-traumatic abdominal pain to emergency department over a 12-month period and whom subsequently underwent abdominal CT were retrospectively reviewed. Patients with serum CRP and WBC count measured on admission or within 24 h of the abdominal CT were selected and those with a history of recent surgery, malignancy, and inflammatory bowel disease were excluded. CT scans were retrospectively reviewed in consensus by two radiologists who were blinded to clinical and laboratory findings and initial radiology reports from time of clinical presentation. Final CT diagnoses were designated either positive or negative based on CT findings for pathology relating to presentation with "acute abdomen". After the completion of image analysis, medical records of the patients were reviewed in order to ensure the compliance with final clinical diagnoses. Chief complaints, WBC counts and CRP levels were analyzed to determine whether they increased or decreased the likelihood of producing a diagnostic CT.

Results

101 patients met the inclusion criteria. Of these 41 (40,6%) had negative and 60 (59,4%) had positive CTs. Of the patients who had positive CTs; 50 and 41 had high CRP and WBC levels, 10 and 19 had normal CRP and WBC levels, respectively. Of the patients with negative CTs; 20 and 21 had high CRP and WBC levels, 21 and 20 had normal CRP and WBC levels, respectively. Right lower quadrant pain and left lower quadrant pain resulted in the highest number of positive CTs, while epigastric pain resulted in the lowest number of positive CTs. The likelihood ratio for CT positivity with a CRP above 5 mg/L (the lower threshold of CRP positivity) was 1.71; while this increased to 7.71 in patients with high CRP and WBC levels and the chief complaint of right lower quadrant pain.

Conclusion

Our results have shown that, high CRP and WBC levels in patients with right lower quadrant pain may represent a potential factor which should guide the decision as to whether CT scanning should be performed in the clinical setting of the non-traumatic acute abdomen.



Cardiovascular signs suggestive of Thoracic Compartment Syndrome (TCS) in emergency setting

C. Liguori, C. Acampora, M.G. Scuderi, S. Daniele, T. Cinque; Radiology Department, AORN Cardarelli, Naples, Italy

Purpose

TCS is an emergency condition based on heart compression due to increased intra-thoracic pressure. MDCT allows a fast and accurate examination of chest and cardiovascular structures in emergency setting. Aim of the study is to evaluate MDCT specificity and sensitivity in detecting cardiovascular signs suggestive of TCS.

Method and materials

From January 2014 to May 2016, retrospective study included 40 patients (mean age 44.6; 21y-82y) admitted to the emergency department with clinical symptoms and signs suspicious for of TCS. All patients underwent a standard multiphase MDCT. Two radiologists analyzed images based on direct and indirect heart-compression signs due to increased compartment pressure: enlargement of superior and inferior cava veins greater than 2/3 of respectively thoracic and abdominal aorta diameter; presence of periportal lymphedema or contrast material reflux in inferior cava/azygos veins; interventricular septum bowing sign, flattened heart sign, compression of the coronary sinus. Imaging findings were compared with final clinical diagnosis as gold standard.

Results

Without an ECG-synchronized CT image, heart signs were obtained examining each post-contrast phase image for adequate results. Sensitivity and specificity were respectively evaluated for each sign: enlargement superior/inferior cava veins (98%-40%), periportal lymphedema (97%-54%), contrast material reflux (97%-52%), interventricular septum bowing (80%-98%), flattened heart sign (45%-96%), coronary sinus compression (77%-95%).

Conclusion

MDCT showed a high specificity (97%) and sensitivity (98%) in detecting respectively direct and indirect signs of TCS. Since most of clinical symptoms are non-specific, radiologists play a key role in the definitive correct diagnosis of TCS.



Acute respiratory failure in emergency: Not only pulmonary embolism

F. Gentili¹, M.A. Mazzei¹, G. Baldini², S. Guerrini¹, N. Cioffi Squitieri¹, F.G. Mazzei³, S. Scolletta², L. Volterrani¹; ¹Department of Medical, Surgical and Neuro Sciences, Diagnostic Imaging, University of Siena, Azienda Ospedaliera Universitaria Senese, Siena, Italy; ²Department of Medical Biotechnologies, University of Siena, Azienda Ospedaliera Universitaria Senese, Siena, Italy; ³Diagnostic Imaging, Azienda Ospedaliera Universitaria Senese, Siena, Italy

Purpose

In the emergency department (ED), patients with dyspnea and high suspicion of pulmonary embolism (PE), often underwent computed tomography (CT) with intravenous (IV) injection of iodinated contrast media to prove this diagnosis. The aim of this work is to prove the real incidence of PE and to illustrate the utility of High Resolution CT (HRCT) in diagnosing alternative causes of acute respiratory failure (or dyspnea).

Methods and Materials

A retrospective analysis was conducted on all patients (N=104, 73 females, mean age of 67 years, range 28-91) who accessed to the ED of Azienda Ospedaliera Universitaria Senese (AOUS) with high suspicion of PE, from January to December 2015. All of them underwent HRCT examination before contrast enhanced CT of the thorax. Well's score, associated symptoms, comorbidity and laboratory findings were recorded for each patient.

Results

All patients showed a Well's score ≥ 1 at clinical examination. Thirty-two out of 104 (30.8%) showed CT signs of acute PE; forty-one out of 104 (39.4%) showed a pulmonary and/or pleural cause of dyspnea as pneumonia, atelectasis, chronic obstructive pulmonary disease (COPD) exacerbation, neoplasm and interstitial lung disease; twenty-nine out of 104 (27.9%) showed a cardiovascular cause of dyspnea as cardiac failure with pulmonary oedema and/or pleural/pericardial effusion; two patients (1.9%) out of 104 showed a mediastinal abscess.

Conclusion

This study shows the high number of negative studies for PE in ED, with an elevated percentage of pleuroparenchymal causes of dyspnea. Given its better identification of parenchymal diseases, HRCT could improve the diagnosis of alternative causes of acute respiratory failure and for this reason should be performed before contrast enhanced CT in the clinical suspicion of PE in the ED.



Diagnostic usefulness of Abdominal Radiographs in the Emergency Department

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Purpose

This retrospective audit was done to evaluate the usefulness of a plain abdominal radiograph (AXR) in the making of a diagnosis to aid patient management in the emergency department (ED). We looked at the indications, diagnostic yield and the proportion of patients who went on to have further imaging.

The plain abdominal radiograph (AXR) is a very commonly requested investigation from the emergency department (ED) of most hospitals. This examination is generally believed to be overused with little value offered towards making a definitive diagnosis. Like all examinations involving ionic radiation, there is a radiation burden on patients (approximately 0.7mSv). There is also a financial cost to every examination done. Evaluating the usefulness will help streamline the referrals to those that will benefit the most.

Methods and Materials

This is a retrospective analysis of 100 consecutive AXRs in January 2016 which were requested from the emergency department and performed at our district general hospital. Data was collected from the emergency department documentation and radiology information and imaging systems. The data was analysed for demographics, indications in patient documentation and on the request forms, findings and the outcomes including further imaging.

Results

A total of 100 consecutive AXRs were reviewed.

- a) Patient demographics - average age 58 (range 1-96). Of these 21% were under the age of 40, 51% of patients were female; of these 10 were <40 years old.
- b) 79% of AXRs did not add any further information to help make the diagnosis. 74% were reported as normal, and 5% showed non-specific and non-relevant incidental findings.
- c) Of the abnormal (21) AXRs, 42.3% (11/26) showed bowel obstruction; 19.2% (5/26) showed foreign body; 11.5% (3/26) showed sigmoid volvulus, 6.75% (2/26) had urinary tract calculi and remainder (5/26) were faecal loading.
- d) The documented patient signs and symptoms were poorly associated with significant AXR findings.
- e) 28% (28/100) went on to have further imaging -
 - 71.4% (20/28) went onto to have CT abdomen
 - 21.4% (6/28) went onto have US abdomen
 - 7.14% (2/28) went onto have further AXRs.
- f) In 20% (20/100) of cases, the AXR helped to make diagnosis/change management plan.

Conclusion

In the emergency department, the diagnostic yield of an AXR is low and most show normal appearances or incidental non relevant findings. Sometimes AXRs are requested indiscriminately without meeting referral criteria. In some cases, diagnoses are missed in ED and patients go on to have further imaging. Sometimes, an AXR is of diagnostic usefulness and can help in confirming a diagnosis and change management especially after review by a radiologist. Refining of guidelines and staff education may help streamline the use of AXRs to specific groups and thereby reduce radiation to the patients and financial burden to the health care system.



INVITED ABSTRACTS

Workshop - Acute abdominal pain | Right upper quadrant pain

R. Basilio; Department of Imaging University of Chieti, Italy

Many disorders of the liver, gallbladder and biliary tree may cause right upper quadrant (RUQ) pain) and acute cholecystitis is the most common cause of acute RUQ pain. However, more than one-third of patients suspected of having acute cholecystitis after initial clinical evaluation are ultimately proved to have a different diagnosis. Although ultrasonography is the primary imaging modality used to evaluate patients with RUQ pain, computed tomography (CT) and MR imaging also play important roles. In fact, CT frequently provides a better overview of the extent of the disease where US visibility is limited and complements the US findings in more complex cases. The combination of US and MR imaging or, more specifically, MR cholangiopancreatography provides excellent potential for diagnosis of acute biliary disease. The spectrum of diseases that may cause RUQ pain includes acute cholecystitis and its complications, gangrene and perforation; mimics of cholecystitis, choledocholithiasis, hepatic artery aneurysm, ascending cholangitis, liver abscess, complications of liver masses such as rupture and hemorrhage. Also other pathologies such as omental infarction, right diverticulitis, duodenal ulcer may manifest with RUQ pain. The radiologist must be familiar with characteristic and unusual appearances of these conditions and be aware of potential pitfalls that can mimic them.

Workshop - Acute abdominal pain | Left lower quadrant pain

A. Agrawal; Teleradiology Solutions, Delhi, India

Left lower quadrant pain may be caused by a multitude of conditions including gastrointestinal, gynecologic and obstetric, genitourinary, vascular, abdominal wall or retroperitoneal pathologies. Imaging plays a major role in differentiating between the various causes to facilitate appropriate and timely management. The choice of the imaging modality is determined by the age and gender of the patient, clinical presentation, and available expertise. Ultrasound is preferred as the initial investigation in women of reproductive age for suspected gynecologic etiology, and in the pediatric population. CT is a widely utilized imaging modality in the emergency setting and apart from accurately diagnosing diverticular disease, the most common cause of left lower quadrant pain, it also offers an alternate diagnosis. MRI may be used as a problem solving modality. Plain radiography is of limited value.

Objectives

1. Outline the various causes of LLQ pain
2. Overview of imaging approach to LLQ pain and ACR appropriateness criteria
3. Case illustrations with a discussion of the disease spectra and key imaging findings



Imaging of bowel and mesenteric injuries

M. Tonerini; Pisa, Italy

Hemoperitoneum detected with diagnostic peritoneal lavage or ultra-sonography is no longer an unequivocal indication for exploratory laparotomy in a stable patient. More emphasis is now placed on nonsurgical management of liver and spleen injuries and on the growing role of the interventional radiology. The concurrent presence of significant bowel or mesenteric injury (BMI), however, would make the conservative treatment (and sometimes the interventional treatment too) inappropriate and necessitate exploratory laparotomy. Therefore, greater sensitivity and specificity of imaging studies are demanded for these types of injury. Nowadays multi-detector CT (MDCT) can correctly and promptly identify most significant traumatic BMIs in both children and adults. The current surgery literature even suggests that a negative contrast-enhanced MDCT can be used as a screening tool to help identify patients who may be discharged without further evaluations. Because so much emphasis is now placed on imaging, this lecture highlights the typical MDCT findings associated with BMI due to blunt trauma. The protocols of MDCT examination are discussed especially as regards the phases of acquisition and the use of intravenous contrast (no oral contrast was administered in the acute phase). The MDCT signs may be: bowel discontinuity, extraluminal air, intramural air, bowel-wall thickening, bowel-wall enhancement, bowel-wall discontinuity, mesenteric infiltration and stranding, mesenteric hematoma, acute bleeding as well as intraperitoneal and retroperitoneal fluids. In addition some pitfalls, leading to misinterpretation, are described.

Imaging of terrorist attacks - Radiological Workflow-Optimization for Mass Casualty Incidents

S. Wirth, K. Wirth, F. Mück, M. Muggenthaler, M. Reiser; Institute for Clinical Radiology, Hospital of the Ludwig-Maximilians-University, Munich, Germany

Learning Objectives

- To know Mass Casualty Incident (MCI) and polytrauma (PT) background
- To know the appearance of typical MCI/PT CT findings
- To know useful key workflow parameters for institutional optimization
- To know the (few) differences between radiological PT and MCI management
- To develop the attitude to actively perform institutional workflow optimization

Background

The medical handling of terrorist attacks and other MCI types like airplane or train crashes is time-critical. Whenever MCI situations become sad reality, every part of the rescue chain has to be prepared in order to handle a large number of severely injured patients almost simultaneously. As MCIs are rare, compared to the MCI relevance, only few guidelines are available, and even in such cases, they mostly cover trauma room and CT workflow management. On the other hand, staff and workflow training is of utmost importance. As a consequence, simulations of MCI events are established for both to get staff trained and to identify potential for workflow optimisation.

Field triage concepts were initially introduced by military and are now established to combine most effective patient treatment with limited resources. Patient distribution matrices assure optimal patient distribution with respect to the surrounding trauma centres. EFAST-ultrasound is easy to perform and is able to help performing field triage more accurately. After patient admission EFAST has the power to screen for those life



threatening injuries which imply immediate surgery without further diagnostics. The accuracy, speed and high availability of modern multislice-CT's drives on-going replacement of conventional x-ray examinations in initial patient handling. It is also known that initial CT scouts often provide very useful information. The quality is limited but with respect to detection of the most relevant findings that may stimulate immediate reaction (like tension pneumothorax) or findings that may influence the CT protocol (like urography phase in case of complex pelvic fractures or scan extension to the proximal femur in case of complex fractures) it seems to be sufficient and in this manner often comparable to conventional chest x-ray examinations. Depending on facility structures they may also be available faster. When performed as a standard, whole body CT polytrauma imaging has already been proven as an independent factor for significantly increased patient survival.

Content

MCI imaging findings are often comparable to injuries in polytrauma patients. Depending on the type of (terrorist) attack, the nature of gun wounds sometimes plays a more important role. In contrast, bomb explosions distribute the injuries in a more random way, are often a mixture of blunt and sharp trauma and the secondary problem of infection may be more relevant. Given effective call procedures for staff, MCI services can mainly be based on standard polytrauma procedures. CT can only be a relevant bottleneck in situations when field /in-house triage result in more than 6 patients per scanner/hour and provided that there is enough capacity to handle more than this number of casualties per hour at the ICU or in the OR.

MCI simulations and their results are presented. They show a possible average CT in-room time within 10 minutes, i.e. from entering to leaving the CT room. In our institution we also noticed mean archiving times of 20 minutes for CT images. As a consequence, image handling and distribution is a very important key measure and its optimisation may be the most effective way to speed up your institutional total service time.

Facility design and in-house distances are very important. For MCI scenarios and especially if more than one CT scanner is available, it saves time to put patients as fast as possible on the CT-table and leave the trauma room more or less as a transit room. Dedicated image processing protocols offer to save time by avoiding time consuming 'perfect' initial reconstructions. A good choice may be to initially generate only axial 1.25 mm slices, reconstruct them automatically only in soft kernel and send them to a directly connected dedicated workstation where layout presets use the axial data to present automatic MPR's in respective useful windowing. In such cases up to six patients may be served per hour and per CT scanner by using a standard whole-body CT polytrauma protocol. Dedicated CT triage protocols may theoretically even increase this number. The decision to deviate from polytrauma standard CT imaging like unenhanced CT triage or manual application of intravenous contrast media during the patient preparation process on the CT table should consider both decrease of exam quality and the more likely bottlenecks of ICU or OR capacity.

However, the time span until images are available at end points is often relatively long and seems to be the most severe radiological bottleneck. It is strongly recommended to train MCI situations and get into an institutional continuous quality improvement process. This should particularly include a solution to avoid scenarios of patients being faster at endpoints than their reports/images. A simple way may be the printing of key images attached to a short manually written report with the most important findings.



Take home points

1. In MCI events, bottlenecks for reasons of staff have to be avoided by both simulation training and effective in-calling procedures.
2. Given this, the mean time from admission to distributed CT images/reports can be kept below 30 minutes. Per CT scanner and hour a throughput of up to 6 patients is possible in high quality with standard PT whole body CT imaging.
3. As image reconstruction and archiving can take up to 75% of the total imaging service time, image handling and distribution remain particular challenges.
4. One possible solution may limit the initial data reconstruction to automatically produced axial images, allowing (a) fast reporting at dedicated radiological workstations using online multi-planar reformations and (b) fast archival of this first report. In a second step, all dedicated manually optimised data reconstruction may be outsourced to a second CT-workstation in order to free the CT-scanner for the next patient.

Keywords

- Computed Tomography
- Emergency radiology
- Mass casualty incident
- Whole-body polytrauma CT imaging
- Radiological workflow

Abbreviations

- ICU Intensive Care Unit
- MCI Mass casualty incident
- CT Computed tomography
- EFAST Enhanced Focused Assessment with Sonography in Trauma
- OR Operation Room
- PACS Picture Archiving and Communication System
- PT Polytrauma

Role of CEUS in blunt abdominal trauma

V. Miele, C.L. Piccolo; Department of Emergency Radiology, S. Camillo Hospital, Rome, Italy

Baseline ultrasound is essential in the early assessment of patients with a huge haemoperitoneum, in order to refer them to the surgery room; nevertheless, even with a highly experienced operator, it is not sufficient to exclude parenchymal injuries. More recently, a new ultrasound technique using second generation contrast agents, named contrast-enhanced ultrasound (CEUS), has been developed. This technique employs a software operating at low mechanical index able to analyse the resonance signals originated by second generation contrast agents without the destruction of bubbles, allowing to perform all the vascular phase in real time. The contrast agent consists of perfluorocarbon or sulphur hexafluoride, encapsulated by a very resistant phospholipid shell, and composed by stabilized gas microbubbles (1-7 micron), which are blood-pool agents with a non-linear reverberation. They remain intravascular and produce a non-linear harmonic response that can be separated from the tissue signal using contrast harmonic ultrasound. The contrast medium is administered with a quick



bolus through an antecubital vein. The arterial phase starts after 10-20 s and proceeds up to 30-40 s. During the venous and late phase, the contrast agent is distributed to the whole capillary bed and the concentration slowly decreases until its excretion through the lungs. The venous and late phase last in the range of 2-6 min, varying in each abdominal parenchyma that is continuously scanned during each contrast phase. USCA is administered IV in two split doses of 2.4 ml each in order to evaluate the right and left upper quadrant separately; it is followed by 10 ml of saline water. The entire examination lasts for 4-6 min.

It increases the ultrasound's capability to detect parenchymal injuries, enhancing some qualitative findings, such as lesion extension, margins and its relationship with capsule and vessels. CEUS has been demonstrated to be almost as sensitive as contrast-enhanced CT in the detection of traumatic injuries in patients with low-energy isolated abdominal trauma, with levels of sensitivity and specificity up to 95%.

Several studies demonstrated its ability to detect lesions occurring in the liver, spleen, pancreas and kidneys on victims presenting low-energy injuries, and also to recognize active bleeding as hyperechoic bands appearing as round or oval spots of variable size.

In a trauma protocol, CEUS should follow conventional ultrasound in the assessment of solid organ injuries. It may be performed using contrast pulse sequencing or using pulse inversion harmonic and energy-modulated technique at low acoustic power. The focus is set to the deeper aspect of the organ with a potential traumatic injury.

Its role seems to be really relevant in paediatric patients, demonstrating to be more sensitive and accurate than baseline ultrasound and almost as sensitive as CT in the identification and characterization of solid organ lesions in blunt abdominal trauma. These features allow to avoid a routine exposure to ionizing radiation.

Nevertheless, CEUS is strongly operator dependent, and it has other limitations, such as the cost of contrast media, lack of panoramacity, the difficulty to explore some deep regions and the poor ability to detect injuries to the urinary tract. Another significant limitation is its inability to detect direct signs of peritoneal bleeding related to intestine or mesentery injuries. However, it should be considered that these lesions occur more frequently in high-energy trauma rather than in the minor trauma and therefore in these patients CE-CT is mandatory.

On the other hand, it is timesaving, and other several advantages, such as its portability, the safety of contrast agent, the lack to ionizing radiation exposure and therefore its repeatability, which allows to follow-up those traumas managed conservatively, especially in cases of fertile females and pediatric patients.

Some recent research advocated the application of CEUS in the follow-up of patients who sustained a low-energy blunt abdominal trauma conservatively managed, until discharge, both in order to reduce unnecessary CT examinations and to overcome poorly visible traumatic injuries at conventional ultrasound, better revealed by USCAs.





Esophageal emergencies

A. Pinto; Department of Radiology, A. Cardarelli Hospital, Naples, Italy

Esophageal emergencies - primarily, perforation and conditions with the potential to progress to perforation - result in significant morbidity and mortality if they are not recognized and treated promptly.

The spectrum of esophageal emergencies includes esophagitis, foreign body impaction, and traumatic esophageal injury. Esophagitis related to the ingestion of caustic substances, irradiation, medication, or infection also may result in acute chest pain.

In severe esophagitis, full-thickness esophageal necrosis may lead to perforation with associated complications.

Foreign body ingestion is most commonly seen in children, people with psychiatric disorders, and prisoners. Sharp or pointed foreign bodies, button batteries, and objects that cause obstruction require emergent removal. When a history of foreign body ingestion is suspected, a radiographic evaluation is performed, generally with conventional radiography of the neck, chest, and abdomen.

Traumatic injury to the esophagus may result from both extraluminal and intraluminal processes. In patients with penetrating trauma to the neck or chest, Multidetector row Computed Tomography (MDCT) can demonstrate the presence of esophageal wall thickening, periesophageal gas and fluid collections, contrast material extravasation and mediastinal fluid.

In the assessment of acute esophageal conditions, MDCT is a useful adjunct to conventional esophagography and direct visualization, helping delineate the location and extent of disease, assess complications, and exclude alternative diagnoses. An awareness of the CT findings associated with the spectrum of acute esophageal disease will promote the radiologist's ability to accurately diagnose esophageal emergencies.

Aortic disease

T. Valente; Naples, Italy

The accurate detection and evaluation of aortic diseases is one of the Radiologist's most important opportunities to improve human health. Aortic pathologies are numerous, presenting manifestations are varied, and aortic diseases present to many clinical services. Many aortic diseases manifest emergently and are potentially catastrophic unless suspected and detected promptly and accurately. Optimal management of these conditions depends on the reported findings from a handful of imaging modalities; in this context, current state-of-the-art multidetector CT (MDCT) is actually the backbone in the emergency setting and for pre- and postoperative aortic imaging because of its intrinsic diagnostic value.

Aortic CT has undergone clinically relevant changes over the last two decades, including recent scanner generations and technological advances. To understand aortic disease, it is important to know the gross and microscopic anatomy of the aorta and the anatomic variants because the different segments of the vessel are subject to different diseases, have different imaging characteristics, branch vessel of different relevance, are accessed surgically by different approaches, and serve various physiologic functions. Anatomic relations explain many aortic disease presentations and complications.



In acute aortic syndromes and following open surgical and endovascular repair techniques, the Radiologist must know and identify common, uncommon, early and late acute syndromes adverse events/complications in which intervention may be required. In this lecture, aortic emergencies and their multidetector CT findings will be presented.

Acute abdomen in oncologic patients

M.A. Mazzei; Siena, Italy

Cancer has become one of the leading causes of deaths worldwide and its high incidence increased the medical care related to complications of this disease in recent years.

Cancer complications may present as an acute life-threatening or insidiously but sometimes they represent the first manifestation of the disease. These complications can be classified as the direct or indirect effects of a tumour. Direct effects include invasion or mechanical compression of anatomical structures adjacent to the tumour and they could be represented by obstruction or perforation, and not rarely by bleeding caused by the rupture of hypervascular lesions. Colorectal carcinomas, gastrointestinal lymphomas and GISTs are the common malignancies that can undergo spontaneous perforation, whereas hepatocellular carcinoma (HCC) represents a common cause of an acute abdomen due to bleeding of an hypervascular lesion. Indirect complications include systemic manifestation of the disease, such as hypercoagulability, immune suppression, and paraneoplastic syndrome. Post-surgical complications and those associated with the side effects of chemotherapy and/or radiation therapy could be also significant. Regarding side effects of radiation therapy early injuries or reactions usually occur within the first 3 months of therapy, whereas late complications typically develop 6 to 36 months after completion of therapy but may also develop many years later.

Imaging examinations play an essential role in evaluating cancer and its complications, and in particular in the diagnosis of acute abdomen. Plain radiography and ultrasonography (US) are generally performed initially in an urgent setting due to their wide availability, low cost, and minimal or no radiation exposure. However, depending on a patient's symptoms, evaluation with cross sectional imaging methods such as computed tomography (CT) and magnetic resonance imaging (MRI) is often necessary for the definitive diagnosis.

This presentation aims to illustrate the various presentations of acute abdomen in an oncologic patient, pinpointing technical aspects useful for the diagnosis and some strategies to optimise CT and MR protocols.

Emergency situations in Patients affected by Inflammatory Bowel Diseases

A. Laghi; Department of Radiological Sciences, Oncology and Pathology, Sapienza - University of Rome, Rome, Italy

Emergency situations may occur in Patients affected by Inflammatory Bowel Diseases (IBDs). Most commonly they are represented by gastro-intestinal bleeding, toxic megacolon, acute abdominal pain and post-operative complications, including anastomotic leaks, abscesses, intestinal intussusception, mesenteric vein thrombosis, obstruction.



Diagnosis and management of gastrointestinal hemorrhage remain a domain of endoscopy. If the bleeding cannot be located by endoscopy, CT or catheter angiography should be performed, unless the patient requires immediate surgery.

In acute, severe colitis a plain abdominal radiograph is an acceptable first study to detect toxic megacolon defined by a mid transverse colonic dilation > 5.5 cm. In equivocal or selected cases CT could be used as the primary imaging modality to screen for complications (e.g. perforation, abscess, thrombosis, ischemia) that require emergency surgery. Toxic megacolon is also predicted by the extent of small bowel and gastric distension in most patients with severe colitis.

Abdominal ultrasound and plain X-ray should be considered in all patients with acute abdominal pain and established IBD. CT should be considered in patients with suspected perforation and negative or inconclusive first line studies.

Acute postoperative complications in IBD patients (e.g. anastomotic leaks, abscesses, intestinal intussusception, mesenteric vein thrombosis, obstruction) should be initially investigated by CT or ultrasound followed by immediate CT if negative or equivocal. Fluoroscopic studies are also effective for assessing anastomotic leaks, in particular distal anastomotic leaks.

Bowel obstruction & Ischemia cases

F.M. Danza; Rome, Italy

Four cases will be presented where the radiological semiology of bowel obstruction and of ischemia are present. These two pathological conditions of the bowel loops can occur separately, but often they are present in the same moment and directly contribute to the imaging presentation in CT studies. Cases are selected for educational purpose. Examples of bowel obstruction are selected to display different involvement of transit, location and wall status of the affected loops. Particular attention has been given to post-operative cases, where the "new imperfect" anatomy plays a significant role in determining obstruction.

The CT findings of intestinal ischemia must be correlated with the surgical data and eventually with the clinical evolution. In cases without surgical confirmation. The critical element of these conditions is the time that elapses between radiological study and the anatomical finding, that can sustain a difference in the diagnosis. In particular ischemia obstruction related is susceptible to variations either in improvement or pejorative depending on the time elapsed and on the pathological condition determining the vascular strangulation as well as the involvement of the venous or arterial axis. These anatomic realities determine different diagnostic patterns in TC. Another critical element to be analyzed is the different penetration of ischemic-necrotizing alteration into the context of the affected wall loop. So it is possible to detect ischemia of the mucosa without a consensual perfusion alteration or coloring on serous on surgical inspection.



CME ACCREDITATION

The application for European accreditation for the ESER Annual Scientific Meeting 2016 was granted 12 European CME credits (ECMEC) by the European Accreditation Council for Continuing Medical Education (EACCME).

DISCLOSURE STATEMENTS

Potential Conflict of Interest Disclosures

It is the policy of the ESER - European Society of Emergency Radiology to ensure balance, independence, objectivity, and scientific rigour in the congress programme. Knowledge of possible relationships with sponsors of any kind is mandatory in order to reinforce the educational and scientific message and to relieve any suspicion of bias.

Any potential conflict of interest involving the organising committee should be made known so that the audience may form their own judgements about the presentation with a full disclosure of the facts. It is for the audience to determine whether the presenter's external interest may reflect a possible bias in either the work carried out or the conclusions presented.

The president, Dr. Mariano Scaglione, did not disclose any relationships.





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The Certificate of Attendance/CME Accreditation will be handed out on the last congress day at the registration desk.

Conference Language

The meeting will be held in English. No simultaneous translation will be offered.

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You are kindly asked to keep your badge visible on the congress grounds at all time.

Onsite Registration Fees

Non-Member	€ 400.00
Member	€ 250.00
Junior Non-Member	€ 290.00
Junior Member	€ 200.00
Student/Resident	€ 40.00

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- admittance to the technical exhibition
- congress programme and abstracts
- certificate of attendance
- coffee breaks

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Attendees of any ESER industry symposium/company slot agree that their registration details may be forwarded to the company organising that symposium/slot. This agreement may be cancelled at any time by writing to the ESER Office.

Name Changes

Name changes will be treated like the cancellation of the registration and a new registration of the other participant.

Future Meeting Desk

This area offers you an overview of future meetings in the field of radiology and related disciplines, from all over the world. Feel free to contribute flyers and posters to promote your own meetings and courses.

Recording

Video- or audio-recording of any sessions or presentations is not allowed without the speaker's/organiser's prior written permission.

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GE HEALTHCARE SYMPOSIUM

Monday, July 4th

15.40 – 16.00

Room Mirabilis



Chest pain management with latest CT innovations: Clinical algorithms drive CT protocols

Prof.Dr.med. Ulf Teichgräber

*Director of the Department of Radiology Institute for Diagnostic
and Interventional Radiology, Universitätsklinikum Jena*





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2016

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COMPANY SLOT INFORMATION

Monday, July 04, 2016

GE Healthcare



15:40-16:00

**Chest pain management with latest CT innovations:
Clinical algorithms drive CT protocols**

Prof. Dr. med. Ulf Teichgräber, Director of the Department of Radiology Institute for Diagnostic and Interventional Radiology, Universitätsklinikum Jena

U. Teichgräber will share his experience with Revolution CT in emergency setting

Tuesday, July 05, 2016



13:30-13:50

Depiction of major traumatic liver lesions with vascular involvement using high concentration contrast medium

L. Romano, Cardarelli Hospital, Naples/IT

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13:50-14:00

Dual Source in Emergency applications

I. Crippa, Italy

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