

Our Contribution to the EuroSafe Imaging Call of Action
ESER – European Society of Emergency Radiology

Do we really need CT after plain-film series in patients with peritonitis and pneumoperitoneum?

Mariano Scaglione, Gerd Schueller, Stefan Wirth, Ferco Berger, Vittorio Miele, Gerard Goh, Ulrich Linsenmaier on behalf of the ESER Board;
Contact: mscaglione@tiscali.it

Be part of the European Society of Radiology's radiation protection initiative, become a Friend of EuroSafe Imaging. www.eurosafeimaging.org

Background

Perforation of an intra-abdominal viscus is traditionally considered an emergency requiring prompt surgery. Despite standard clinical care indicating that the presence of clinical signs of acute abdomen and pneumoperitoneum identified on plain x-ray obviates the need for further imaging studies and constitutes an indication for laparotomy, in our level I accident and emergency (A&E) centre there is an increasing tendency to perform CT of the abdomen in patients with pneumoperitoneum proven by plain film. However, in the literature it is not known whether abdominal CT provides additional, useful information in this case.

Aim

The aim of this study is to determine whether or not CT changes clinical management and outcome of patients with free air on plain x-ray series.

Material and methods

A retrospective study carried out over one year at a major academic A&E medical centre. All patients in our acute care surgery database with pneumoperitoneum on plain x-ray and clinical signs of peritonitis were included. Patients were divided and compared in two groups: patients who underwent a subsequent CT scan (plus CT) and patients who did not (non-CT group).

Results

Forty-eight patients were included in this study (31 males, 17 females). There were 28 patients in the non-CT group and 20 patients in the CT group. All patients underwent surgery.

Among the CT group, colonic perforation (11 patients, five with perforated colonic cancer), perforated gastro-duodenal ulcer (six patients) and small-bowel perforation (three patients) were the final diagnosis. Among the non-CT group, colonic perforation (11 patients), colonic perforation after colonoscopy (four patients), perforated gastro-duodenal ulcer (seven patients) and small bowel perforation (six patients) were the final diagnosis. No false positive case of pneumoperitoneum was registered.

No significant difference in terms of indication for surgery and/or patient outcome were noted between the two groups.

Forty-one percent underwent CT, which is a significant percentage of patients. This is in contrast to the traditional teaching. Furthermore, in this series, CT did not change the indication for surgery or influenced the patient outcome.

Conclusion

In patients with peritonitis and pneumoperitoneum on plain-film series, CT does not appear to significantly alter management either by effecting the decision to operate or by influencing patient outcomes.

The main drawbacks of the use of CT scanning include: 1. delay to surgery, 2. additional costs, 3. additional radiation exposure and 4. increased medical risks. The main limitations of this study include: 1. single centre/relatively small number of patients and retrospective study design, 2. difficulty to really understand the reasons why CT was required and performed due to the retrospective nature of the study, 3. exclusion of the patients with discordant clinical versus radiographic findings or complex clinical background.



Fig. A: Male, 28 years old, admitted to the Emergency Center emergency centre for acute abdominal pain. Upright plain film shows small amount of free air under the left hemidiaphragm.

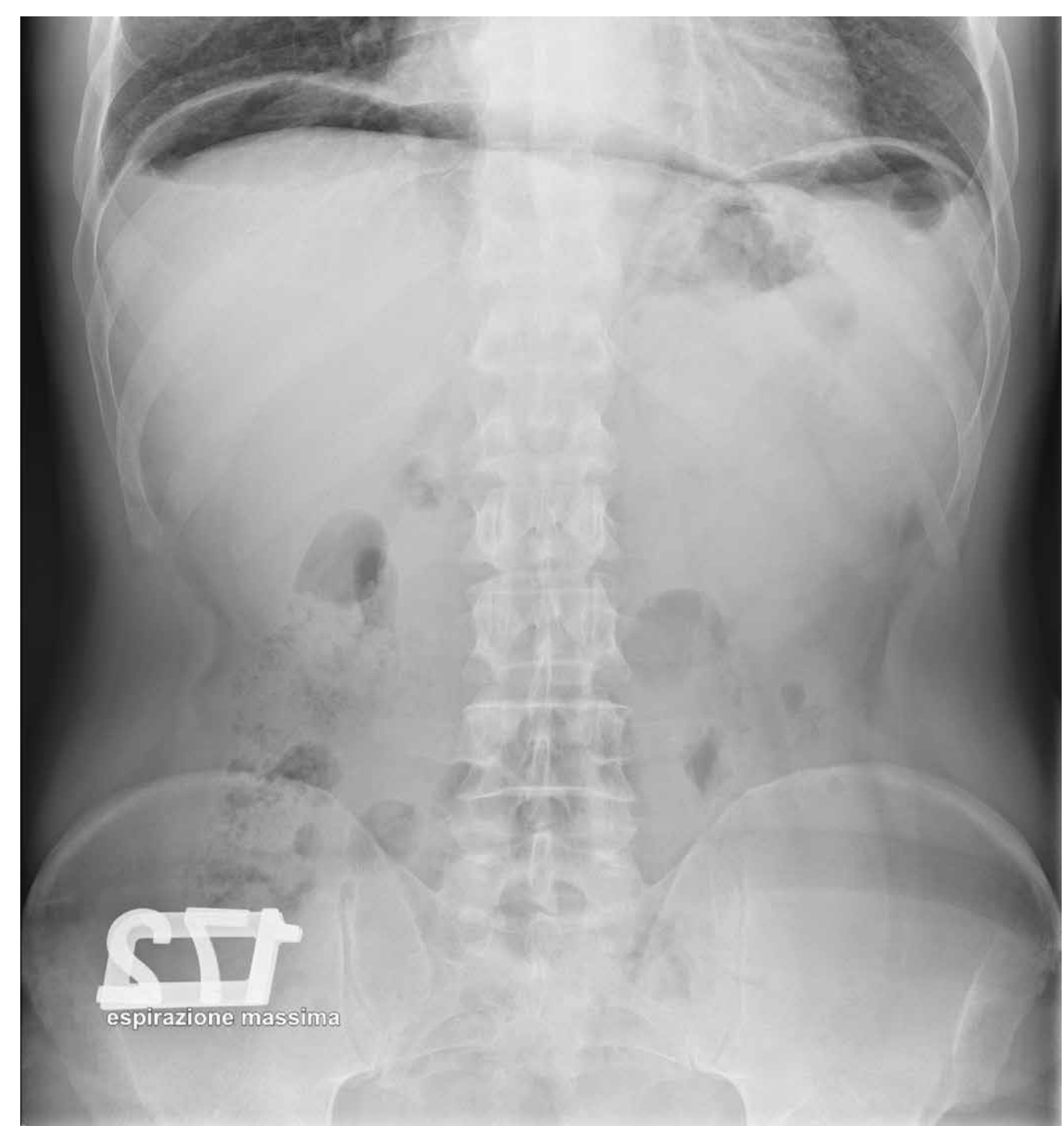


Fig. B: Plain film obtained at maximum expiration, demonstrates increased amount of free under the diaphragm, in keeping with hollow viscus perforation. In surgery, perforated duodenal ulcer was demonstrated.

References

- Postier RG, Squires RA. Acute abdomen. In: Townsend CM, Beauchamp RD, Evers BM, Mattox KL, editors. Sabiston Textbook of Surgery: The Biological Basis of Modern Surgical Practice. 18th ed. Philadelphia: Saunders; 2008. pp. 1180–98.
- Furukawa A, Sakoda M, Yamasaki M, Kono N, Tanaka T, Nitta N, et al. Gastrointestinal tract perforation: CT diagnosis of presence, site, and cause. *Abdom Imaging*. 2005;30:524–34.
- Catalano O. Computed tomography in the study of gastrointestinal perforation. *Radiol Med*. 1996;91:247–52.
- Grassi R, Romano S, Pinto A, Romano L. Gastro-duodenal perforations: Conventional plain film, US and CT findings in 166 consecutive patients. *Eur J Radiol*. 2004;50:30–6.
- Oguro S, Funabiki T, Hosoda K, Inoue Y, Yamane T, Sato M, et al. 64-Slice multidetector computed tomography evaluation of gastrointestinal tract perforation site: Detectability of direct findings in upper and lower GI tract. *Eur Radiol*. 2010;20:1396–403.