Evaluation of the Necessity of the Three-film Abdominal Series in the Diagnosis of Abdominal Pain

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Abstract

The routine plain-film abdominal series, consisting of supine and upright abdominal radiographs and upright chest radiograph of 246 patients, who presented with abdominal pain from the emergency room of Bangkok Metropolitan Administration Medical College and Vajira Hospital from January 2000 to May 2001 were reviewed.

Each radiograph was independently interpreted to detect any radiographic abnormality. Radiographic abnormalities were detected in 35 per cent on abdominal films and 13 per cent on chest films. The supine abdominal views could diagnose abnormalities in 84 per cent of these patients while the upright views diagnosed abnormalities in only 16 per cent of these cases. Most of the detectable abnormalities in the upright views were pneumoperitoneums that were clearly demonstrated on the upright chest radiographs.

So elimination of the upright abdominal view from the routine plain-film abdominal series in the screening of surgical cases from medical cases could result in cost-saving and a decrease in radiation exposure without significant loss of diagnostic information.

Key word : Three-Film Abdominal Series, Abdominal Pain, Diagnosis

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Plain-film abdominal series are requested to evaluate patients with abdominal pain and to screen the surgical cases from the medical cases. The patient must pay at least 300 baht for this investigation in government hospital[1]. The abdominal radiographic series generally provides a low yield of positive diagnostic information as seen in a previous study[2-5].

The aim of this study was to evaluate the frequency of the radiographic abnormality on the plain-film abdominal series in patients with abdominal pain, assess the independent value of each abdominal radiograph and reduce the cost of abdominal radiographic study by eliminating the less useful abdominal radiograph from the three-film abdominal series.

MATERIAL AND METHOD

The plain-film abdominal series, consisting of supine and upright abdominal and upright chest films of 246 patients, presenting with abdominal pain from the emergency room of Bangkok Metropolitan Administration Medical College and Vajira Hospital from January 2000 to May 2001 were reviewed. The selected patient's age were all older than 15 years; both men and women.

All radiographs were reviewed by two radiologists without knowledge of the final diagnosis. Kappa statistic for agreement of two radiologists was 60 per cent. However, the suspected radiographs were interpreted and resolved by consensus. Each abdominal radiograph was independently interpreted to detect any radiographic abnormality and placed into one of 8 diagnostic categories. They were pneumoperitoneum, free fluid in the peritoneal cavity, intestinal obstruction, specific ileus (appendicitis, pancreatitis, cholecystitis and peritonitis), stone (gallstone and urinary tract stone), calcification, aerobilia and organomegaly.

The chest radiographs were interpreted as intrathoracic and extrathoracic diseases. The radiographic findings were considered to be significant if they were diagnosed for a specific disease.

RESULTS

The 246 abdominal radiographs were reviewed, 86 (35%) of the patients revealed radiographic abnormalities in the abdomen, suggesting specific diseases and 160 (65%) of the patients showed no observed abnormality (Table 1). In 37 (43%) of the 86 abdominal abnormalities, both supine and upright views of the abdomen revealed radiographic abnormalities. In 35 (41%) of the abdominal abnormalities, only supine radiographs showed radiographic abnormalities while in 14 (16%) of the patients, the abnormalities were observed on the upright radiographs (Table 2).

There was a significant difference between the supine and upright abdominal radiographs ($p < 0.05$).

Of these 14 cases, 13 cases were pneumoperitoneum and the remaining case was intestinal obstruction. All pneumoperitoneums were diagnosed on both upright chest and upright abdominal radiographs.

The specific ileus, consisting of appendicitis, pancreatitis, cholecystitis and peritonitis were diagnosed in 35 cases. They were 24 cases of appendicitis, 8 pancreatitis, 2 cholecystitis and 1 peritonitis.

Table 1.   Radiographic diagnosis.

	Frequency	Per cent	Cumulative per cent
Pneumoperitoneum	13	5.3	5.3
Free fluid	2	0.8	6.1
Intestinal obstruction	11	4.5	10.6
Specific ileus	35	14.2	24.8
Gallstone	8	3.3	28.0
KUB stone	8	3.3	31.3
Calcification	3	1.2	32.5
Organomegaly	6	2.4	35.0
No observed abnormality	160	65.0	100.0
Total	246	100	-

Table 2.   Comparison between supine and upright abdominal films of observed abnormality.

Observed abnormalities	Comparison between supine and upright abdominal films			
	S = U	S > U	S < U	Total
Pneumoperitoneum	-	-	13	13
Free fluid	1	1	-	2
Intestinal obstruction	5	5	1	11
Specific ileus	23	12	-	35
Gallstone	3	5	-	8
KUB stone	-	8	-	8
Calcification	1	2	-	3
Organomegaly	4	2	-	6
Total	37	35	14	86
Per cent	43	41	16	100

S = supine abdominal film, U = upright abdominal film
S = U means finding was detected on both supine and upright views
S > U means finding was detected on supine view
S < U means finding was detected on upright view

Thirteen cases of appendicitis were operated on. The remaining 11 cases were diagnosed as medical diseases and treated conservatively.

Of the 13 cases underwent operations, 10 were confirmed to be appendicitis. The remaining 3 cases were 2 normal appendices and 1 pancreatitis. In 8 cases of pancreatitis, 4 cases were confirmed by elevated serum and urine amylase level. Three cases were operated on, 2 were ruptured appendicitis and 1 was carcinoma of the transverse colon.

The remaining case was not confirmed either by operation or by blood investigation.

Two cases of cholecystitis were diagnosed due to presence of gallstones and localized ileus at the right upper quadrant area of the abdomen. One case of peritonitis was operated on, resulting from a ruptured appendix. Intestinal obstructions were diagnosed in 11 cases, 2 cases were large bowel obstruction and 9 cases were small bowel obstruction. Of two cases of large bowel obstruction, one case was operatively confirmed to be carcinoma of the sigmoid colon, the other showed no abnormality by colonoscopy.

Four cases of small bowel obstruction were operated on. Most of them were caused by adhesion bands but one case was intussusception. Five cases of small bowel obstruction were not operated on but all of them had a history of previous surgery.

Thirteen pneumoperitoneums were caused by peptic ulcer perforation. The chest radiographs of 246 patients revealed abnormalities in 33 (13%) cases, consisting of 20 intrathoracic diseases (5 pneumonia, 13 tuberculosis and 2 pleural effusion) and 13 intraabdominal diseases (13 pneumoperitoneum). The chest radiographs were normal in 213 (87%) cases.

DISCUSSION

Abdominal radiographs are requested to exclude or confirm the clinical diagnosis. Most of them are ordered as a routine screening procedure.

Eisenberg et al[2] found that only 10 per cent of 1780 patients showed radiographic abnormalities.

Mirvis et al[4] found abnormalities in 20 per cent of the abdominal radiographs of 252 emergency room patients with abdominal pain. In the present series, the abdominal radiographs showed 35 per cent of abnormalities of 246 patients with abdominal pain.

The result of the present study also showed that upright radiographs were less useful than the supine views. The upright radiographs were useful for detection of pneumoperitoneum but they could be replaced by upright chest radiographs.

Repeated studies of the upright view are performed much more frequently than the supine view due to poor quality of the film. This leads to higher cost and more radiation exposure.

So elimination of the upright film from the abdominal radiographic series can reduce the cost and

radiation exposure to the patient[3,4,6]. The gonadal dose per film at 74/60 kVp/mAs is 125 m rad[7].

In conclusion, the upright abdominal radiograph can be eliminated from the standard abdominal radiographic series without loss of diagnostic informa-tion in order to reduce the cost and radiation exposure.

Two radiographs, consisting of supine abdominal and upright chest radiographs are recommended in the screening evaluation of abdominal pain.

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การประเมินความจำเป็นของภาพรังสี 3 ภาพ ในการวินิจฉัยอาการปวดท้อง

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ได้ทบทวนภาพรังสีช่องท้องซึ่งประกอบด้วยท่านอน ท่ายืนและภาพรังสีทรวงอก ท่ายืนของ ผู้ป่วย 246 คน ที่มี อาการปวดท้อง จากห้องตรวจฉุกเฉินนอกเวลาราชการของวิทยาลัยแพทยศาสตร์กรุงเทพมหานครและวชิรพยาบาล ตั้งแต่เดือน มกราคม 2543 – พฤษภาคม 2544

ภาพรังสีแต่ละภาพจะถูกแปลผลอย่างอิสระ เพื่อหาลักษณะผิดปกติทางรังสี ซึ่งตรวจพบได้ 35% จากภาพรังสี ช่องท้อง และ 13% จากภาพรังสีทรวงอก

ภาพรังสีช่องท้องท่านอน สามารถพบลักษณะผิดปกติทางรังสีได้ถึง 84% ขณะที่ท่ายืนพบได้เพียง 16% ซึ่งความ ผิดปกติส่วนใหญ่ที่พบในภาพรังสีช่องท้องท่ายืน ได้แก่ การมีลมในช่องท้อง ซึ่งสามารถตรวจพบได้จากภาพรังสีทรวงอกท่ายืน

ดังนั้น การตัดภาพรังสีช่องท้องท่ายืนออกจากการถ่าย 3 ภาพ ที่ทำเป็นประจำ จะช่วยลดค่าใช้จ่ายและปริมาณรังสี ต่อผู้ป่วยโดยไม่มีการสูญเสียข้อมูลในการวินิจฉัย

คำสำคัญ : ภาพรังสีช่องท้องสามภาพ, อาการปวดท้อง, การวินิจฉัย

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