



## Original Contribution

# The implications of abdominal palpation with Ou MC manipulation for women with acute abdomen

Ming-Cheh Ou MD, PhD<sup>a, b, c, \*</sup>, Chung-Chu Pang BMS<sup>d</sup>, Dennis Ou MA<sup>d</sup>, Chin-Hsu Su MD, PhD<sup>d</sup>

<sup>a</sup>Department of Obstetrics and Gynecology, Taipei City Hospital, Taipei, Taiwan 103

<sup>b</sup>Department of Obstetrics and Gynecology, Taipei Medical University, Taipei, Taiwan 110

<sup>c</sup>Department of Obstetrics and Gynecology, Yang-Ming University, Taipei, Taiwan 112

<sup>d</sup>Department of Obstetrics and Gynecology, Su Woman Hospital, Taipei, Taiwan 108

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**Abstract**

**Objectives:** Abdominal palpation with Ou MC manipulation (APOM) has showed to be more sensitive than bimanual pelvic examination for the diagnosis of pelvic inflammatory disease in women with acute abdomen (*JEM*, 2010;). This study compared APOM with traditional abdominal palpation (AP) for diagnostic reliability and enquired into the mechanism of APOM.

**Methods:** From January 2006 through December 2009, 113 women with acute abdomen attending an emergency department received AP and APOM. Of the 113 women, 91 had pelvic organ disease, whereas 21 had nonpelvic organ disease and 1 had pelvic and nonpelvic organ disease concurrently.

**Results:** Excluding the case with concurrent pelvic and nonpelvic organ disease, the sensitivity of APOM for the diagnosis of pelvic organ disease was significantly greater than that of AP ( $P = .003$ ). Abdominal palpation with Ou MC manipulation also showed greater specificity of excluding pelvic organ disease than did AP ( $P = .003$ ). Overall, 37.2% of patients with muscle guarding had repeated APOM or APOMs with aggravated isolation, which made the location of the diseased organ more distinct to identify.

**Conclusions:** The delimitation by APOM as a separation zone may allow positional recognition of the tenderness with decreased overlap of signs. However, in cases with muscle guarding, initial APOM might not be able to locate tenderness effectively until repeated APOM or APOMs with aggravated isolation lead to extensive space shielding and isolation of visceral organs. This implies that tenderness location by APOM may also relate to space shielding and pelvic organ isolation.

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## 1. Introduction

The parietal peritoneum is innervated by branches from nerves that supply the muscles and skin of the overlying body wall and has a similar spinal level origin. Thus, stimulation of the parietal peritoneum can elicit a well-localized pain, which enables the identification of a diseased organ [1]. Traditional

abdominal palpation (AP) is an important procedure for identifying the location of abdominal tenderness in women with acute abdominal pain. However, the proximity of intra-abdominal organs can cause significant overlap of abdominal pain presentation. The high frequency of gynecologic diseases in women of childbearing age further complicates the differentiation of the sources of abdominal pain [2]. Thus, AP has limited use when excluding pelvic organ diseases.

Abdominal palpation with Ou MC manipulation (APOM) is used to help localize the tenderness associated with organs in the pelvis by isolating the visceral peritoneum and organs

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\* Corresponding author. PO box 59346, Taipei City, Taiwan. Tel.: +886 2 23881498.

E-mail address: mcou@ym.edu.tw (M.-C. Ou).

in women [3]. The central hypogastric area defined by Ou MC manipulation is a trapezoid anatomical functional area (viz, the Ou MC area) [4]. In this study, APOM was used to help identify the source of abdominal pain in women with acute abdomen. The sensitivity and specificity of this procedure for diagnosis of pelvic organ disease were compared with the diagnosis by AP.

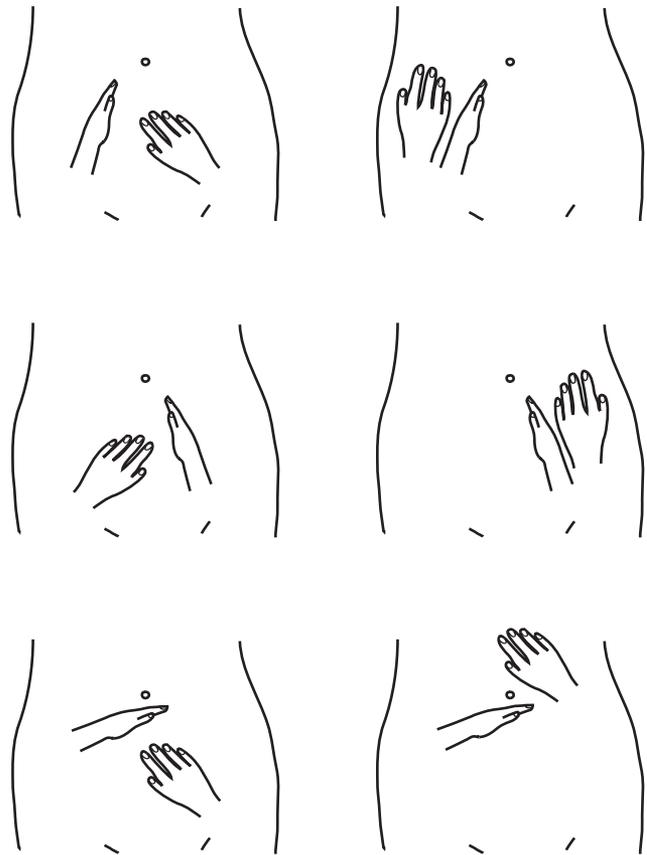
## 2. Patients and methods

### 2.1. Patients

This study included consecutive women with acute abdominal pain for AP and APOM examination at an ED from January 2006 through December, 2009. The initial ED examination included AP, APOM, a complete blood count with white blood cell differential, urinalysis, pregnancy test, abdominal ultrasound, and radiograph. The law of investigational review board for Taiwan was administered in December 2009 at the end of this study [5]. Nonetheless, new physical examination is exempt from informed consent by investigational review board with the law in Taiwan. However, all the patients received APOM with a consent in this study.

### 2.2. Methods

Abdominal palpation with Ou MC manipulation was performed by placing a hand in a chopping gesture along a line from the subumbilicus to the femoral arterial canal of the inguinal area while the patients were in the lithotomy position. Adequate pressure is applied against the pelvic wall to isolate the pelvic organs in the hypogastric region from other abdominal organs. The other hand is used to palpate either side of the isolating hand. Finally, a hand is put horizontally on the top of the Ou MC area, and the bilateral areas are palpated by the other hand (Fig. 1). A chart is used for this study, and, if there is tenderness that is more prominent or localized inside the Ou MC area, this is considered to indicate pelvic organ disease (Fig. 2). If the tenderness is more prominent or localized outside the Ou MC area, pelvic organ disease is excluded. In the case with prominent tenderness inside and outside the Ou MC area, the tenderness that does not alleviate in either area after repeated APOMs with aggravated isolation may indicate concurrent pelvic organ and nonpelvic organ disease. Tenderness beneath the hand for isolating the pelvic organ is not eligible for diagnosis because it may be a result of compression of the great vessels. Muscle guarding may prevent a deep isolation. If muscle guarding is present, repeated APOM or APOMs with aggravated isolation are performed to isolate the pelvic organ after a moment of initial APOM. The location for abdominal tenderness by AP is categorized as inside or outside pelvic area, and AP is repeated if the location of tenderness is uncertain. The tenderness inside the pelvic area



**Fig. 1** Abdominal palpation with Ou MC manipulation. The edge of one hand is placed along a line from the subumbilicus to the femoral arterial canal of the inguinal area, pressing against the pelvic wall to better isolate the pelvic organs in the hypogastric area; the other hand is used to palpate either side. Finally, a hand is put horizontally on the top of the Ou MC area, and the bilateral areas are palpated by the other hand.

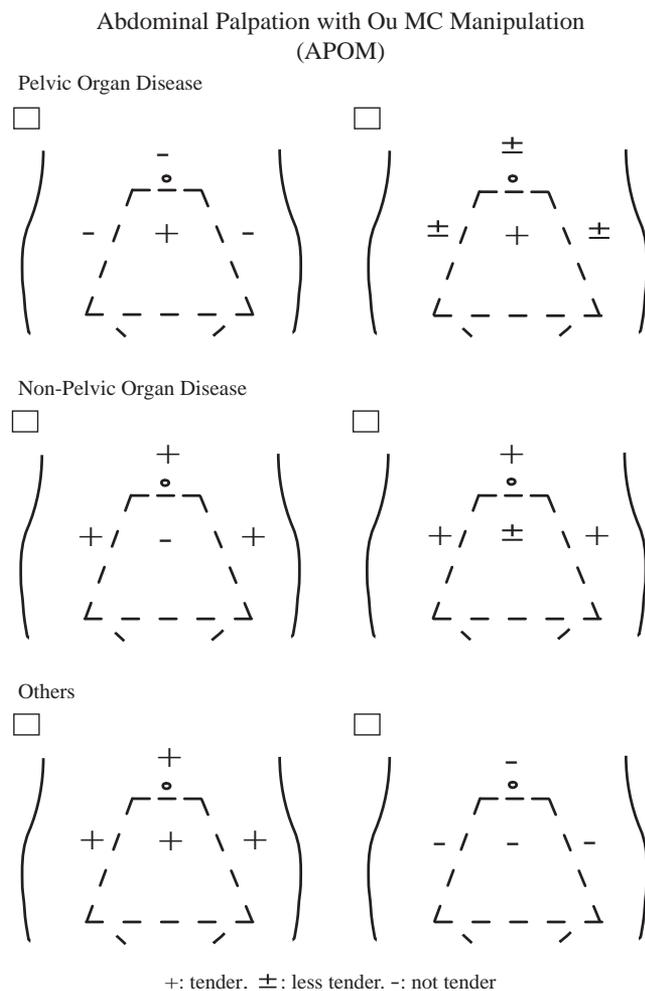
is considered to indicate pelvic organ disease, and the tenderness outside pelvic area excludes pelvic organ disease.

### 2.3. Diagnostic criteria for final diagnosis

Pelvic inflammatory disease (PID) was documented in a similar manner to that in a study of APOM according to the criteria by the US Centers for Disease Control and Prevention [3]. Ectopic pregnancy, ovarian cyst torsion, salpingitis, appendicitis, and sigmoid colon cancer with intestinal obstruction were all diagnosed based on surgical and pathologic results. Patients with unconfirmed diagnoses were excluded from the final analysis.

### 2.4. Data analysis

Excluding concurrent pelvic and nonpelvic organ disease, the abdominal diseases were classified into 2 groups, namely, pelvic organ disease and nonpelvic organ disease. Tenderness or more prominent tenderness in the Ou MC area



**Fig. 2** A pelvic organ disease is suspected if the tenderness is more prominent or localized inside the Ou MC area (the central trapezoid hypogastric region defined by Ou MC manipulation). In contrast, a contrary result of examination excludes pelvic organ disease. Prominent tenderness that does not alleviate either inside or outside Ou MC area after repeated APOMs with aggravated isolation of pelvic organ may indicate concurrent diseased organ in each area.

and the preliminary pelvic organ disease diagnosed by AP were distributed as the result of examination approving the diagnosis for pelvic organ disease. A contrary result for the examination was said to indicate a diagnosis of nonpelvic organ disease (Fig. 2).

The  $\chi^2$  test with Yates' correction was used to compare the sensitivity and specificity of APOM and the AP for diagnosis of pelvic organ disease and nonpelvic organ disease. A *P* value (2 tailed) below .05 was considered to be statistically significant. Power analysis was performed with an  $\alpha$  level of .05 (2 tailed).

### 3. Results

Two hundred fifty-five consecutive women with acute abdomen received APOM. One hundred thirteen patients had

a confirmed diagnosis. Among these 113 patients, 91 patients had pelvic organ disease, 21 patients had nonpelvic organ disease, and 1 patient had both pelvic and nonpelvic organ disease as salpingitis and appendicitis. The mean age (SD) of the 91 patients with a diagnosis of pelvic organ disease was 31.5 (9.5) years; 85 were of childbearing age (15-45 years), and 2 were over 50 years (56 and 61 years). Twenty-one patients had a diagnosis of nonpelvic organ disease. These patients had a mean age (SD) of 36.1 (11.6) years, and 17 were of childbearing age; 1 was over 55 years (57 years). The patient with concurrent pelvic and nonpelvic organ disease was 51 years.

One hundred forty-two had an unconfirmed diagnosis. Among these 142 patients, 62 patients had unconfirmed pelvic organ disease, 19 patients had unconfirmed nonpelvic organ disease, and the remaining 61 patients had an unconfirmed tentative diagnosis.

#### 3.1. The patients with pelvic organ disease

Ninety-one patients had a final diagnosis of pelvic organ disease, including 82 with PID, 8 with ectopic pregnancy, 1 with ovarian cyst torsion, and all showed with pelvic organ disease by APOM. Abdominal palpation could not indicate pelvic organ disease in 10 patients with PID; of these patients, 9 had a diagnosis of appendicitis and 1 had a diagnosis of diverticulitis by AP (see Table 1). Thus, APOM yielded a greater sensitivity (100%) for pelvic organ disease than did AP (81/91; sensitivity, 89%; *P* = .003; power > 0.95).

#### 3.2. The patients with nonpelvic organ disease

Abdominal palpation with Ou MC manipulation indicated more prominent or localized tenderness outside the Ou MC area, which is consistent with nonpelvic disease in 21 patients. Nine patients with nonpelvic disease were misdiagnosed as pelvic organ disease by AP, including 1 with

**Table 1** The number of consecutive cases correctly identified by each method in women with acute abdomen

Pelvic organ disease	Identified		Nonpelvic organ disease	Identified	
	no. <sup>a</sup> /total no.	APOM AP		no. <sup>a</sup> /total no.	APOM AP
PID	82/82	72/82	Appendicitis	20/20	12/20
Ectopic pregnancy	8/8	8/8	Sigmoid colon cancer with intestine obstruction	1/1	0/1
Ovarian cyst torsion	1/1	1/1			

A case with concurrent salpingitis and appendicitis excluded.

<sup>a</sup> Data are number of cases correctly identified by each method.

sigmoid cancer complicated with intestinal obstruction and 8 with appendicitis (see Table 1). Overall, APOM exhibited a significantly greater specificity (100%) than AP (12/21; specificity, 57%;  $P = .003$ ; power > 0.95) for excluding pelvic organ disease.

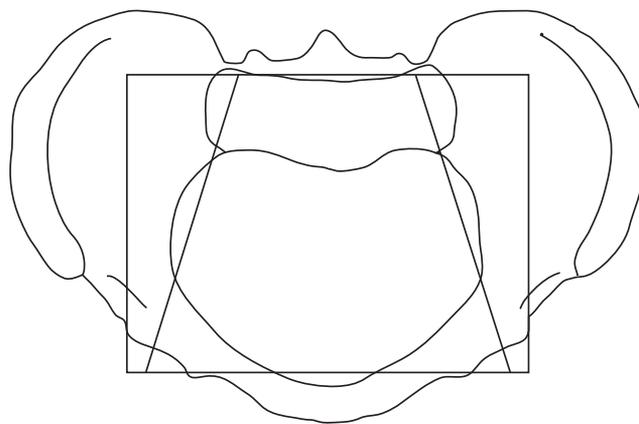
### 3.3. The patients with repeated APOM for abdominal muscle guarding

Forty-two patients (37.2%), including 32 with pelvic organ disease, 9 with nonpelvic organ disease, and the 1 with concurrent pelvic and nonpelvic disease, had prominent muscle guarding that caused a resistance for pelvic organ isolation. These patients received repeated APOM or APOMs with aggravated isolation after a moment of the initial one. The tenderness became more distinct in the area of diseased organ and alleviated apparently or eliminated in the other area after repeated isolation or isolations (Ou MC decrescendo phenomenon). The abdominal tenderness of the patient with concurrent pelvic and nonpelvic organ disease did not alleviate either inside or outside the Ou MC area after repeated APOMs with aggravated isolation. All these patients endured the repeated APOM or APOMs well.

## 4. Discussion

Abdominal palpation with Ou MC manipulation is based on the anatomy of the lower abdomen, which can be divided into the hypogastric area and the bilateral iliac areas. The ascending and descending colons are located in the bilateral iliac areas, whereas the vermiform appendix is usually in the right iliac fossa area. However, the traditional hypogastric area involves not only the pelvic region but also other abdominal areas [6]. The Ou MC area traces along the pelvic ring and involves less nonpelvic region than the hypogastric area does. Thus, this trapezoid isolated anatomical functional area is more closely related to the functions of the organs in pelvic area than the traditional hypogastric area (Fig. 3).

The line from the subumbilicus to the femoral artery canal is parallel to the true pelvic rim. With APOM, the Ou MC area is insulated by pressing the hand against or near the true pelvic ring of the pelvic wall to isolate pelvic organs as much as possible, reducing the influence from other abdominal areas. This allows a more accurate identification of the most tender area. In this way, APOM divides the abdominal cavity into 2 compartments that allows tenderness to be identified in each area separately and categorizes abdominal pain as being within the Ou MC area or outside the Ou MC area to locate the diseased organ. Thus, APOM would seem to help to identify the location of tenderness in 3 ways. These may be firstly because there is a separation of the zones; secondly, because space shielding takes place; and thirdly, because there is isolation of the pelvic organs.



**Fig. 3** The Ou MC area traces along the pelvic ring and contains most pelvic organs. Thus, this trapezoid isolated anatomical functional area is more closely related to the functions of the organs in pelvic area than the traditional hypogastric area.

Although the parietal peritoneum elicits well-localized abdominal pain [1], AP examines the abdominal cavity as a continuum, and overlapping of signs is extremely common; this may make the location of a diseased organ uncertain. Abdominal palpation with Ou MC manipulation divides the abdominal area into 2 sides by a zone formed by the isolation hand, which reduces the overlap of signs. Thus, APOM may categorize the abdominal area as being either within the Ou MC area or outside the Ou MC area to locate the diseased organ in a distinct zone. The use of such a separation method would seem to decrease vagueness and uncertainty when identifying the location of tenderness during diffuse abdominal pain. As a consequence, APOM may help the location of tenderness to be recognized because of the use of a separation zone that decreases the overlap of signs.

When APOM isolates the pelvic organs, the abdominal cavity is separated into 2 spaces. The isolation hand in APOM acts like the diaphragm that separates the chest and abdomen. This approach helps to reduce the uncertainty of the location of tenderness among patients who have a poor perception of the area where the tenderness is. However, a deep isolation would seem to identify the location of tenderness more distinctly than a shallow one. This indicates that a walling-off effect of the tenderness may occur, which is related to locating the abdominal tenderness by space shielding from other abdominal area during APOM. This effect is in addition to the separation zone effect.

Although APOM isolates the parietal peritoneum, it also isolates the visceral peritoneum and organs. Visceral pain afferents supplying the pelvic organs have common innervation with the appendix, ureters, and colon. Their significant overlap makes an accurate location difficult for the patient to discern [7]. However, an intensified isolation of the pelvic organs allows the patient to pinpoint the location of the tenderness more distinctly than a weaker one. This means that intensified isolation of the pelvic visceral peritoneum and organs may also contribute, in part, to

locating abdominal pain using APOM in addition to space shielding during aggravated isolation. However, present evidence seems to show that visceral pain is ambiguous when locating the affected organ. Nonetheless, intensified isolation of pelvic organs may help identify the location of tenderness, and it indicates that factors other than visceral afferents may exist.

#### 4.1. Limitations

It is comprehensible that, if the patient had coexistent pelvic organ and nonpelvic organ disease in the abdominal cavity or abdominal disease, with complications rendering more severe tenderness in the compartment than that of the diseased organ, APOM may not be able to locate the compartment of the diseased organ. In addition, the female pelvic area is mainly filled with reproductive organs, urinary bladder, and great intestines. If the pelvic organs are removed, other diseased organ may fill the pelvic cavity and causes prominent tenderness in the Ou MC area. In this study, a patient with concurrent pelvic and nonpelvic organ disease showed prominent tenderness both inside and outside the Ou MC area.

#### 5. Conclusions

Acute abdomen and pelvic processes account for more than half of emergency surgical procedures [8]. The underlying cause of acute abdomen pain varies; some cases require surgical treatment, whereas others do not. A rapid and accurate diagnosis is essential for treatment of these

emergency conditions because a delay may lead to severe complications. Abdominal palpation with Ou MC manipulation has showed in this study to have higher sensitivity and specificity for the diagnosis of acute abdomen in women than AP. The mechanism by which a separation zone, space shielding, and pelvic organ isolation occur may account for the capacity of APOM in position recognition of abdominal tenderness. Based on the above findings, this approach warrants further study.

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