An Unexpected Turn: An Unusual Case of a Metastatic Ovarian Carcinoma Arising from a Colorectal Malignancy

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ABSTRACT

Krukenberg tumors are very rare. Its origin is difficult to define especially if its gross features mimic a primary ovarian cancer. We present a case of a 24-year-old Filipino female patient with metastatic mucinous ovarian adenocarcinoma of colonic origin that mimicked primary ovarian cancer and genitourinary tuberculosis. Surgery was done and histopathology revealed that the cancer was a metastatic mucinous adenocarcinoma of colonic origin. This case highlights the importance of differentiating between benign and malignant ovarian lesions as well as distinction between primary and metastatic ovarian neoplasms. Radiological imaging has an evolving role in diagnosis of different cancers, which may be improved through better clinical correlation and developing meaningful differential diagnosis while advancing to a more strategized algorithm in the diagnostic approach.

Keywords: Krukenberg tumor, ovarian cancer, mucinous adenocarcinoma, ovarian metastasis, colorectal cancer

INTRODUCTION

Krukenberg tumors are metastatic ovarian neoplasms that contain mucin-secreting cells originating from the gastrointestinal tract, with majority originating from the stomach.[1] Only 11% of Krukenberg tumors arise from the colon.[2] Clinical presentation includes increasing abdominal girth and abdominal pain. In this case report, we have a 24-year-old patient with an unusual presentation of low back pain, difficulty in ambulation, and an enlarging abdominal mass without apparent gastrointestinal symptoms. Initial diagnoses were primary ovarian malignancy and genitourinary tuberculosis but eventually turned out to be metastatic mucinous ovarian carcinoma.

CASE REPORT

A 24-year-old Filipino female patient without co-morbidities presented with a 4-month history of low back pain and difficulty in ambulation. Progressive abdominal enlargement with associated hypogastric pain, unintentional weight loss, and vomiting episodes were noted. However, there were no changes in bowel movement, fever, abnormal vaginal bleeding, or anorexia. Pertinent physical examination showed a palpable non-tender immovable hypogastric mass measuring approximately 8.0 x 11.0 cm (W x L). The patient previously had a history of pulmonary tuberculosis but completed treatment. There is also a family history of colon, ovarian, and breast cancer. Upon consult, abdominal ultrasound (US) (Figure 1) was done which

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showed bilateral ovarian new growth with non-benign features, aortic lymphadenopathies, and liver nodules. Initial considerations were malignant bilateral ovarian new growth and abdominopelvic tuberculosis.

Further work-up showed anemia (serum hemoglobin: 10.9 mg/dL; Normal range: 12 to 15 mg/dL), and elevated CA 19-9 (1653 U/mL; normal range <37 U/m), CA 125 (49.60 U/mL; normal range <35 U/mL) and Carcinoembryonic antigen (CEA) (377.50 ng/mL; normal range <2.5ng/mL).

Contrast-enhanced Computed Tomography (CECT) scan of the abdomen showed an enlarged, lobulated, predominantly cystic pelvic mass (Figure 2). The mass shows intralesional thin enhancing septations with solid components. The mass appears to encase the uterus with abutment of the superior urinary bladder wall and compression of the iliac arteries. It displaces the rectosigmoid colon with resultant luminal compression.

Other findings (Figure 3) showed multiple liver nodules measuring up to 1.1 x 2.1 cm (W x L), circumferential rectal and transverse colonic wall thickening and luminal narrowing, retroperitoneal lymphadenopathies, and an ill-defined, heterogeneously-enhancing expansile sacral lytic lesion measuring 5.7 x 4.4 x 5.1 cm. Necrosis with resultant destruction of the left sacral ala and widening of the left sacroiliac joint space are seen.

A CECT of the chest (Figure 4) was also done which showed diffuse bilateral reticulonodular opacities in a tree-in-bud configuration predominantly in a peripheral and basal distribution. Suggestive interlobular septal thickening is also noted.

Initial impression was diffuse endobronchial spread of tuberculosis; cannot totally rule out metastases. Furthermore, abdominal findings could also be from tuberculosis or primary ovarian carcinoma with metastases.

Surgery was done and intraoperative findings showed multi-loculated and enlarged ovaries containing mucinous material. Solid areas and papillary excrescences on the surface of the ovaries were also noted. There was also a 4.0 x 3.0 cm

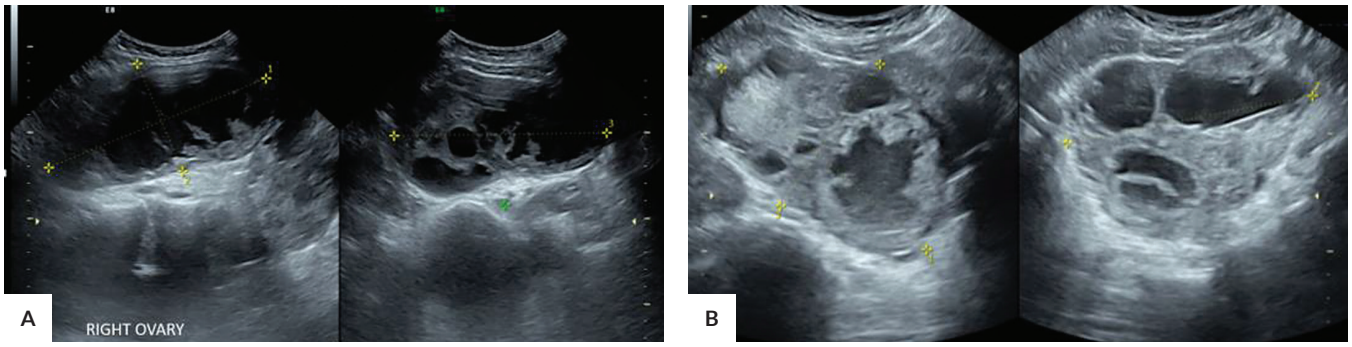

Figure 1. ***Pelvic ultrasound (US).*** Sagittal and transverse images of the right adnexa **(A)** showed an enlarged right ovary which measures 12.6 x 11.8 x 6.6 cm, (L x H x W) with multiloculated solid mass lesions containing locules of varying sizes with solid components with rich color flow (IOTA Adnex, risk of malignancy = 65.2%, chance of benign tumor = 34.8%, risk of borderline tumor = 15.0%.). **(B)** The left adnexa also showed solid multiloculated mass lesions measuring 11.7 x 10.7 x 7.4 cm, (L x H x W) containing locules of varying sizes with solid components with rich color flow (IOTA Adnex risk of malignancy = 49.1%, chance of benign tumor = 50.9%, risk of borderline tumor = 20.4%).

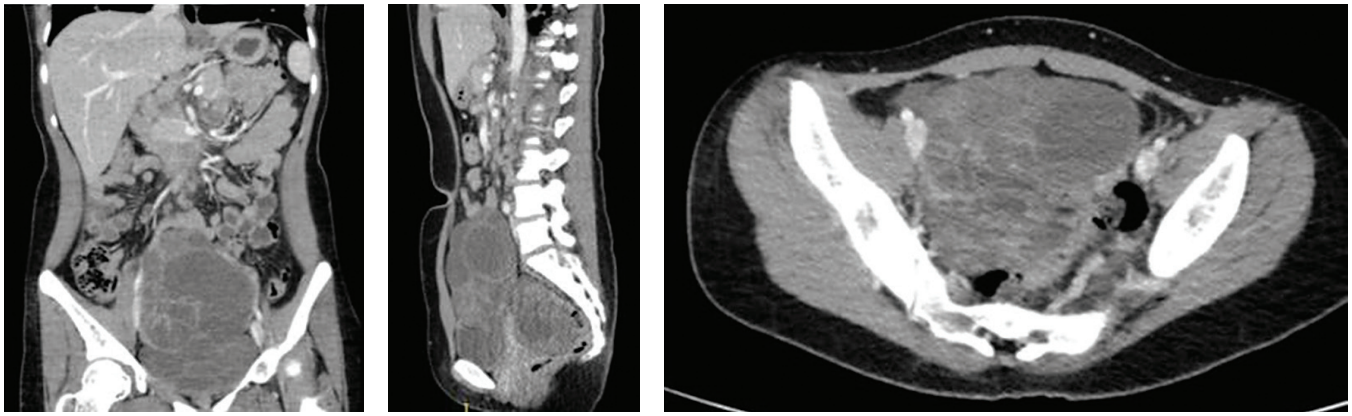

Figure 2. Contrast-enhanced CT scan of the whole abdomen showing the large lobulated complex pelvic mass with mass effect to the adjacent structures.

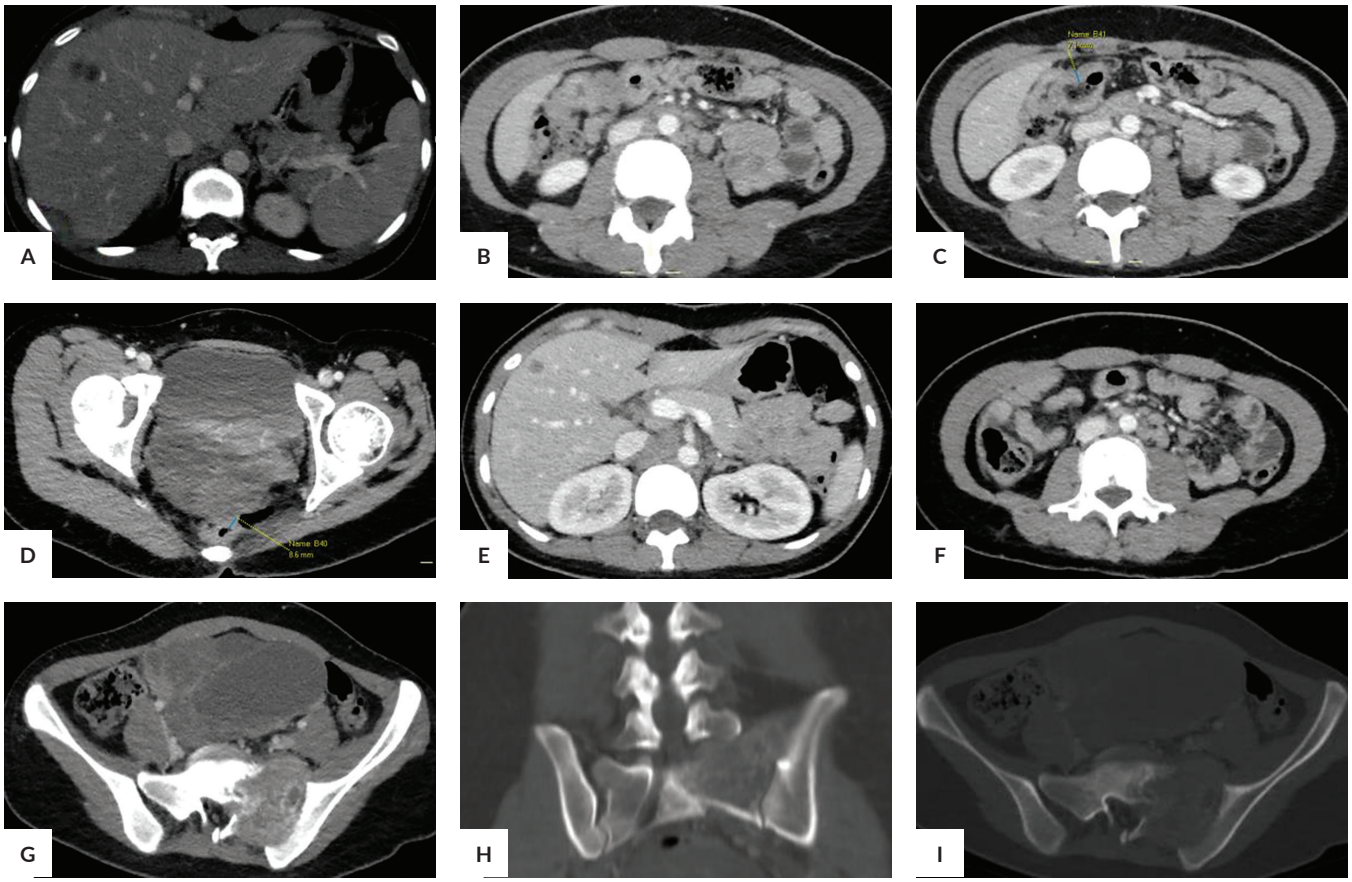

Figure 3. ***Contrast-enhanced CT.*** Other findings showed **(A)** hepatic nodules; **(B-D)** segmental colonic wall thickening; **(E-F)** abdominal lymphadenopathy; **(G-I)** ill-defined enhancing lytic sacral bone lesions.

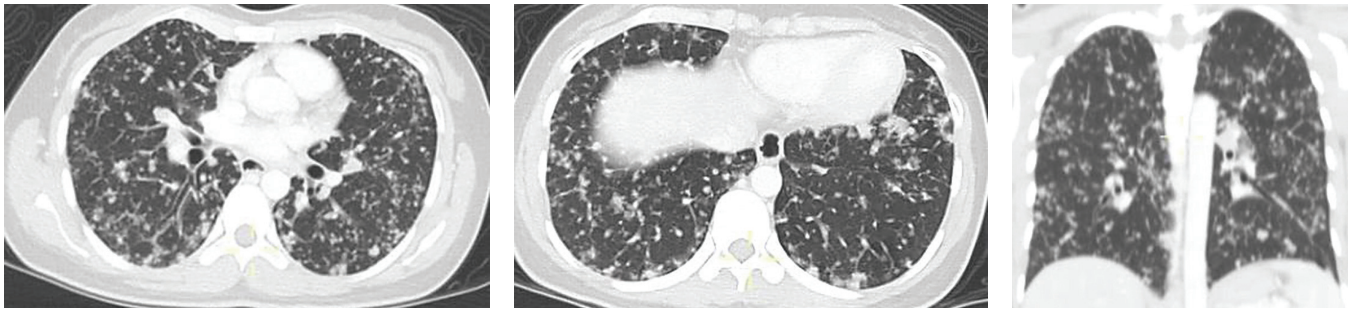

Figure 4. Axial and coronal contrast-enhanced CT of the chest lung window showing diffuse bilateral reticulonodular densities in centrilobular pattern.

solid mass at the proximal portion of the transverse colon near the hepatic flexure (Figure 5). The colonic mass is located 18 cm and 7 cm from the ileal and colonic lines of resection, respectively. Exploratory laparotomy, total abdominal hysterectomy and bilateral salpingo-oophorectomy, bilateral pelvic lymph node dissection, omentectomy and right hemicolectomy with side by side anastomosis were eventually performed.

Histopathology revealed mucinous ovarian and colon adenocarcinoma (Figures 6 and 7). The colonic mass grossly invades through the muscularis propria and pericolic fat to a depth of 0.6 cm. Sectioning of the colon reveals a brown tan, fungating, sessile mass measuring 4.0 x 4.0 x 0.5 cm found on the mesenteric side of the colon covering 270 degrees of the circumference which obstructs approximately 70% of the lumen. Immunohistochemical stains were then applied and came out positive for p16, Cyclin D1, CK7 (focal), and MUC5 which eventually favored a colonic origin of the tumor.

Post-operative course was unremarkable. Peritoneal fluid culture for *Mycobacterium tuberculosis* also showed

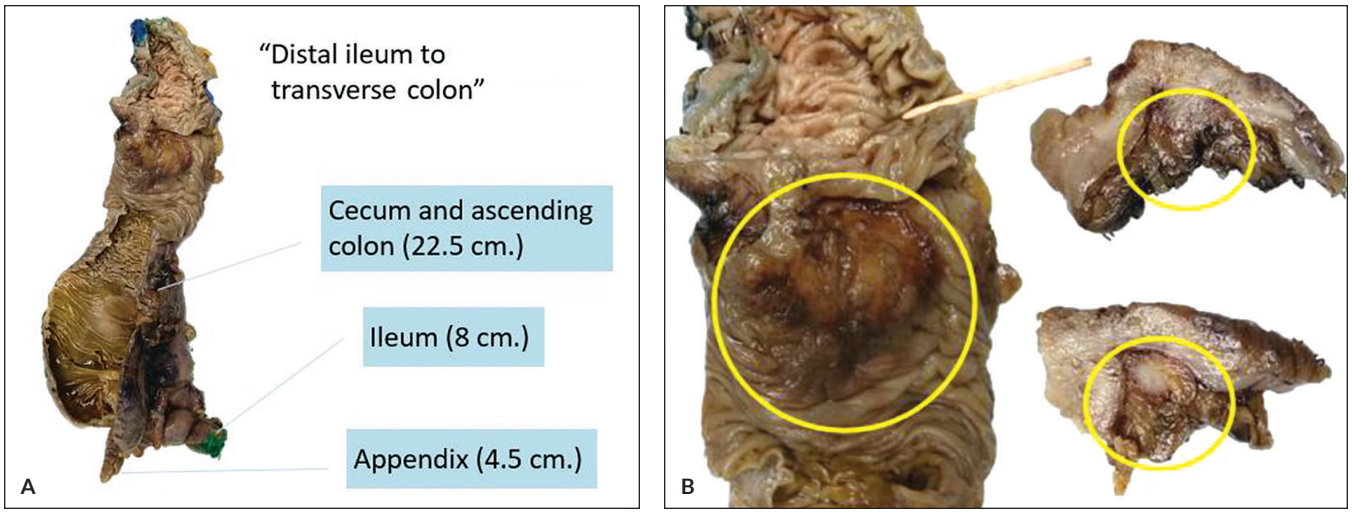

Figure 5. ***Transected bowel segment from*** **(A)** distal ileum to proximal transverse colon; **(B)** colonic mass *(marked by a yellow circle)* on the mesenteric side of the colon found proximal to the hepatic flexure.

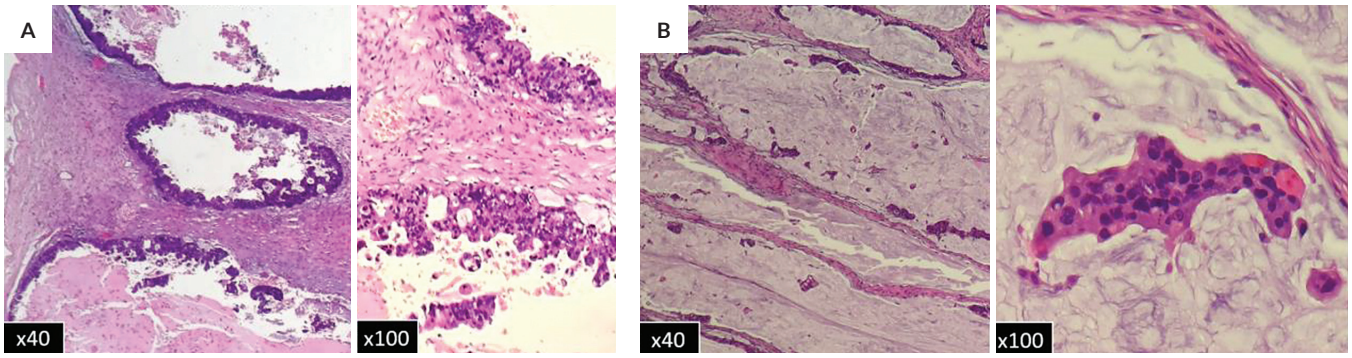

Figure 6. ***Cross-section of the right ovary with H&E stain showing mucinous adenocarcinoma (x40 and x100 magnification).*** **(A)** atypical glandular cells in disorganized tubular/glandlike patterns and **(B)** atypical glandular cells floating in pools of mucin. Similar features are seen in the left ovary.

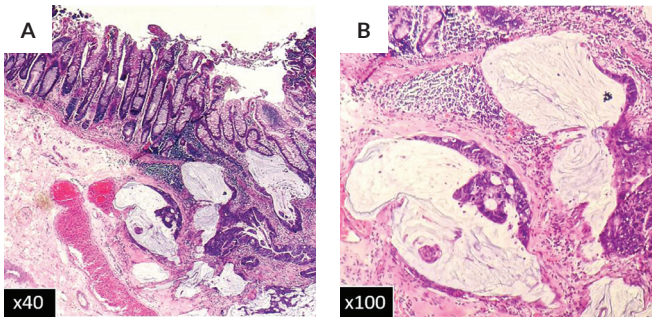

Figure 7. ***Cross-section of the colonic mass with H&E stain showing mucinous adenocarcinoma.*** **(A)** x40 magnification showing continuity between the normal colonic mucosa *(left)* and the tumor *(right)*; **(B)** x100 magnification shows apparent pools of mucin.

negative results. The patient was eventually discharged and had undergone a chemotherapeutic regimen of FOLFOX (Leucovorin, 5-FU, and Oxaliplatin) every two weeks for a total of 12 cycles. The patient is currently undergoing palliative care.

DISCUSSION

The presence of a large complex cystic abdominopelvic mass in a 24-year-old female may have several differentials including genitourinary tuberculosis and primary ovarian cancer.

According to Rossi et al.[3], tree-in-bud opacities in the lungs may give a wide range of differential diagnoses and most commonly occur in endobronchial spread of tuberculosis. CT findings usually show centrilobular nodules with branching linear opacities commonly involving the anterior upper lobes.[4] Bronchial wall thickening, consolidation, cavitation, pleural effusion, and lymphadenopathy are also present. The

chest CT findings of our patient also presented with diffuse bilateral pulmonary tree-in-bud opacities, making this finding non-specific for tuberculosis.

In a study by Sah et al.[5], CT findings in genitourinary tuberculosis usually show bilateral complex pelvic adnexal masses with multilocular necrotic enhancement. Ascites and enhancing peritoneal thickening are also present. Our patient also presented with multiloculated complex pelvic mass with minimal ascites. However, these are also non-specific and can be seen in malignant processes. Furthermore, Bomanji et al.[4] stated that genital tuberculosis most frequently involves the fallopian tubes, particularly presenting as hydrosalpinx with tubo-ovarian masses, findings that are not seen in our patient. Moreover, liver and bone lesions in our patient are atypical for pulmonary tuberculosis.

Multiloculated complex ovarian new growths are also seen in primary mucinous ovarian cancers. However, primary mucinous ovarian adenocarcinoma is not common, occurring in only 0.5-1.5% of ovarian neoplasms.[6] Nulliparity and significant family history are two primary risk factors for developing ovarian cancer[2], as in the case presented. Sonographic findings are also non-specific, showing large, multiloculated cystic masses containing echogenic material. However, majority of cases initially diagnosed with primary ovarian cancer are truly ovarian metastases from different origins, such as the gastrointestinal tract as seen in Krukenberg tumors. Currently, there is no gold standard to differentiate primary from metastatic ovarian cancer. Survival rates for primary ovarian mucinous adenocarcinoma have only been 8% for stage II or higher.[6]

However, a helpful diagnostic algorithm was developed by Hu et al.[7] for distinction between primary versus metastatic ovarian tumors. The study showed that the majority of primary ovarian tumors are predominantly cystic, similar in our patient. These primary ovarian tumors tend to be larger and often unilateral. Metastatic ovarian cancers are frequently smaller and often originate in the gastrointestinal tract. Ovaries are frequent sites of metastasis of many cancers, frequently occurring in young menstruating females.[8] Therefore, bilateral ovarian masses found at initial diagnosis should always be assumed to be metastatic.

Ovarian metastasis of colonic origin also known as Krukenberg tumors are a very rare mucin-producing ovarian neoplasm occurring in only 1-2% of all ovarian tumors.[9] Female patients with this type of tumor are younger than those who have primary ovarian cancer.[10] Radiographic findings in the abdomen are non-specific showing bilateral masses with cystic and solid components.[11] Chest CT findings of tree-in-bud opacities may also be seen in pulmonary intravascular tumor embolism of Krukenberg tumors.[12] This is due to filling of the centrilobular arteries by tumor cells and intimal hyperplasia of the pulmonary arteries.[3]

Radiological imaging such as CT and US are useful diagnostic tools that help in equivocal clinical diagnosis of neoplastic lesions. A diagnosis of primary ovarian tumor rather than metastasis impacts patient management leading to incorrect prognostication and treatment.[1,7] When bilateral ovarian masses are encountered, metastasis should be highly suspected and a search for a probable primary site is recommended, particularly in the gastrointestinal tract.

CONCLUSION

In conclusion, imaging findings of Krukenberg tumors are non-specific showing bilateral masses with a mixture of cystic and solid lesions. Imaging findings are usually inconclusive but may be able to narrow down the differential diagnosis. In cases of bilateral adnexal or ovarian masses, metastasis should be primarily considered unless proven otherwise.

This case report highlights the importance of developing meaningful differential diagnoses and defining the role and extent of radiologic imaging in the diagnosis of Krukenberg tumors.

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Statement of Authorship

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Author Disclosure

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