Influenza-associated intrapelvic myositis in an elderly person presenting with gait disturbance
Hiroaki Iwasaki

DESCRIPTION
A 75-year-old man presented to our emergency department in winter with fever and difficulties in ambulation starting from the previous day. The patient had poorly controlled type 2 diabetes mellitus (T2DM; glycated haemoglobin, 8.1%; reference range, 4.6%–6.2%) and advanced chronic kidney disease (CKD; estimated glomerular filtration rate, 29 mL/min/1.73 m²; reference range, ≥60 mL/min/1.73 m²), for which he received continuous insulin and allopurinol treatment. The patient failed to receive influenza vaccination before the influenza activity began in the community and had coryza and sneezing for the past few days. His body temperature on arrival to our hospital was 38.0°C. These features in the middle of January, an influenza season in Japan, had prompted the influenza testing. Therefore, rapid antigen detection using a nasopharyngeal viral swab was immediately performed, which led to a diagnosis of influenza type A infection prevailing in the place of his residence right then.

The patient experienced right hip pain that developed inability to bear weight on his right leg and to take a turn to the left and right. Physical examination revealed unrestricted range of motion of bilateral hip joints and flexion—adduction—internal rotation, and negative results of the Faber Patrick test and psoas sign for hip joint diseases and psoas abscess, respectively. Laboratory examination on arrival revealed leucocytosis (white blood cell count, 12.2 × 10⁹/L; reference range, 3300–8600/mm³) with a left shift and high levels of serum C-reactive protein (CRP, 9.29 mg/dL; reference range, 0–0.40 mg/dL), creatine kinase (CPK, 9920 IU/L; reference range, 32–187 IU/L), aldolase (30.6 IU/L; reference range, 2–6.1 IU/L) and myoglobin (4656 IU/L; reference range, <60 IU/L). Pelvic radiograph

Figure 1 Pelvic radiograph on arrival was normal, with no evidence of fracture (A). Non-contrast-enhanced CT on admission revealed an apparent swelling of the right obturator internus muscle (B, arrow).

Figure 2 Serial assessments of right obturator internus and externus muscles using MRI. T2-weighted imaging 1 day after admission revealed inflammatory changes in the muscles ((A), arrow). Follow-up examinations revealed sequential regression of the muscle thickness, with a decreased signal at 10 day ((B), arrow) and 20 day ((C), arrow).
was normal (figure 1A); however, non-contrast-enhanced CT to elucidate the presence or absence of bacterial coinfection revealed a swelling of the right obturator internus muscle (figure 1B). The patient was at a higher risk for pyomyositis with an impaired immune system due to poorly controlled T2DM. MRI examination for pyomyositis has the several beneficial points, including ability to visualize early inflammatory changes in muscle tissues before abscess formation and high resolution of soft tissues for accurate assessment of lesion spread to surrounding tissues. An enhanced signal was noted in the right obturator internus and externus muscles on T2-weighted MRI, surmised to be due to focal myositis of the corresponding region (figure 2A).

In addition to inhaled neuraminidase inhibitor therapy for influenza type A infection, piperacillin/tazobactam was also intravenously administered after blood cultures were obtained, considering the possibility of a complicating pyomyositis at the inflamed site. Haematological findings revealed improved systemic inflammatory biomarkers and myogenic biochemical markers (white blood cell count, 6.5 x 10^9/L; CRP, 0.26 mg/dL; CPK, 52 IU/L; aldolase, 3.2 IU/L and myoglobin, 65 IU/L) at day 10. As the obturator internus muscle is deeply located, signs of inflammation of the muscle may be difficult to detect clinically and precise radiological evaluation is indispensable to confirm refractory and recurrent myositis. Follow-up MRI revealed that the inflammatory changes in the muscles were partially resolved at day 10 (figure 2B). Pyomyositis was unlikely because of the following: (1) absence of concurrent muscle injury/trauma, (2) a benign clinical course with abrupt symptom onset, (3) involvement of multiple muscles, (4) no definitive abscess formation within the muscles, (5) high levels of serum myogenic biochemical markers and (6) no evidence of bacteraemia (blood culture results negative for bacteraemia). Infections with coxsackieviruses groups A and B, *Clamdophila pneumoniae* and *Mycoplasma pneumoniae* were excluded through serological testing. Overall, influenza-associated myositis was diagnosed and treatment with antibiotics was discontinued at day 10. The patient was able to walk without right hip pain and limping and was discharged on day 15. There was no flare-up of his myositis (figure 2C). Follow-up for 1 year after discharge was uneventful.

Influenza-associated myositis is surmised to be caused by direct viral penetration into myocytes via sialic acid receptors, damage induced by viral toxins and/or immune reactions during a cytokine storm. Elderly persons with underlying chronic medical conditions, such as T2DM and CKD, are at a higher risk for a variety of influenza-associated complications, which are possibly applicable to focal myositis. Therefore, influenza-associated myositis may be considered in such patients with musculoskeletal symptoms, including gait disturbance, despite it being a rare complication of influenza in adults.

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**Learning points**

- Intrapelvic myositis is a rare complication of influenza in adults, but may be considered in patients with gait disturbance.
- CT and MRI are sensitive to detecting influenza-associated focal myositis and may help in differential diagnosis for the patients presenting with abnormal findings for myogenic biochemical markers.
- An elderly person with underlying type 2 diabetes mellitus and chronic kidney disease may be predisposed to influenza-associated myositis.

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**Contributors** HI was the patient’s physician, was responsible for case description and literature review and wrote the manuscript.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** None declared.

**Patient consent for publication** Obtained.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**REFERENCES**