Parsonage-Turner syndrome following COVID-19 vaccination

INTRODUCTION
Parsonage-Turner syndrome (PTS), also known as neuralgic amyotrophy, is an acute idiopathic brachial neuritis, typically characterised by acute onset of excruciating pain followed by weakness and wasting in the upper limb.1 Antecedent events such as infection, exercise, trauma, surgery and vaccination are reported in events such as infection, exercise, trauma, following COVID-19. We reviewed medical records of the patients who were diagnosed with PTS following COVID-19 vaccine. We identified 12 patients (7 men and 5 women) who developed PTS after a receipt of COVID-19 vaccine. Clinical features of the patients are summarised in Table 1 (and online supplemental figure). Age ranged between 23 and 81 (average 51). Vaccination was the only possible trigger in all cases. Six patients had received adenoviral vector-based vaccines (four received AstraZeneca and two received Janssen), and the others had mRNA-based vaccines (five had Pfizer and one had Moderna). All but two developed PTS after receipt of the first dose of COVID-19 vaccine. The interval from the vaccination to symptom onset and nadir ranged between 2 days and 16 days (median 6,5) and between 3 days and 55 days (median 20,5), respectively. Disease severity at nadir varied across patients, with Medical Research Council grade of the weakest muscles ranging from 2 to 5. Electrodiagnostic studies revealed abnormalities consistent with brachial neuritis in most patients.

Intriguingly, PTS occurred at the same side of vaccine injection in all but two cases (contralateral in patient 8 and bilateral in patient 12). Notably, MRI or sonographic evaluations revealed prominent ipsilateral axillary and/or cervical lymph nodes in seven of eight patients (87.5%) (online supplemental figure). CSF analysis showed albuminocytological dissociation in all three tested patients (patients 1, 3 and 12). We administered oral or intravenous corticosteroid in all patients but three: two patients showed rapid clinical improvement (patients 5 and 7), and one patient refused to receive the treatment.

METHODS
We reviewed medical records of the patients who were diagnosed with PTS following COVID-19 vaccination in three referral hospitals (Seoul, South Korea) between June and October 2021. We collected and analysed the detailed clinical information as follows: the type and order (in case of different types) of COVID-19 vaccine, laterality of symptom presentation, timeline regarding the vaccination, symptom onset and nadir, clinical presentation, motor grade at nadir, the results of electrodiagnosis, brachial plexus MRI, cerebrospinal fluid (CSF) analysis, treatment regimen and the outcomes.

RESULTS
We identified 12 patients (7 men and 5 women) who developed PTS after a receipt of COVID-19 vaccine. Clinical features of the patients are summarised in Table 1 and online supplemental figure. Age ranged between 23 and 81 (average 51). Vaccination was the only possible trigger in all cases. Six patients had received adenoviral vector-based vaccines (four received AstraZeneca and two received Janssen), and the others had mRNA-based vaccines (five had Pfizer and one had Moderna). All but two developed PTS after receipt of the first dose of COVID-19 vaccine. The interval from the vaccination to symptom onset and nadir ranged between 2 days and 16 days (median 6.5) and between 3 days and 55 days (median 20.5), respectively. Disease severity at nadir varied across patients, with Medical Research Council grade of the weakest muscles ranging from 2 to 5. Electrodiagnostic studies revealed abnormalities consistent with brachial neuritis in most patients.

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### Table 1 Summary of clinical characteristics

<table>
<thead>
<tr>
<th>No</th>
<th>Sex/age (years)</th>
<th>Vaccine (dose)</th>
<th>Laterality</th>
<th>Days from vaccination to symptom onset/ nadir</th>
<th>Weakest muscle strength at nadir (MRC)</th>
<th>MRI</th>
<th>CSF analysis*</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M/31</td>
<td>Janssen</td>
<td>Ipsilateral</td>
<td>6/7</td>
<td>III</td>
<td>MRI</td>
<td>WBC 0, protein 70</td>
<td>None</td>
<td>Full recovery by week 1</td>
</tr>
<tr>
<td>2</td>
<td>M/37</td>
<td>Janssen</td>
<td>Ipsilateral</td>
<td>14/14</td>
<td>IV+</td>
<td>MRI</td>
<td>Normal</td>
<td>Oral prednisolone, gabapentin</td>
<td>Near-full recovery by week 10</td>
</tr>
<tr>
<td>3</td>
<td>M/71</td>
<td>AstraZeneca (first dose)</td>
<td>Ipsilateral</td>
<td>16/35</td>
<td>III</td>
<td>MRI</td>
<td>WBC 2, protein 57</td>
<td>Oral prednisolone, gabapentin</td>
<td>Poor recovery by week 15</td>
</tr>
<tr>
<td>4</td>
<td>M/63</td>
<td>AstraZeneca (first dose)</td>
<td>Ipsilateral</td>
<td>14/14</td>
<td>III</td>
<td>MRI</td>
<td>ND</td>
<td>ND</td>
<td>None</td>
</tr>
<tr>
<td>5</td>
<td>F/65</td>
<td>AstraZeneca (first dose)</td>
<td>Ipsilateral</td>
<td>5/6</td>
<td>III</td>
<td>MRI</td>
<td>ND</td>
<td>None</td>
<td>Full recovery within month 9</td>
</tr>
<tr>
<td>6</td>
<td>M/61</td>
<td>AstraZeneca (second dose)</td>
<td>Ipsilateral</td>
<td>2/3</td>
<td>II</td>
<td>MRI</td>
<td>ND</td>
<td>Oral prednisolone</td>
<td>Partial recovery by month 5</td>
</tr>
<tr>
<td>7</td>
<td>F/31</td>
<td>Cross-vaccination (AstraZeneca and then Pfizer)</td>
<td>Ipsilateral</td>
<td>2/10</td>
<td>IV</td>
<td>MRI</td>
<td>ND</td>
<td>Full recovery by week 3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>F/50</td>
<td>Pfizer (first dose)</td>
<td>Contralateral</td>
<td>4/16</td>
<td>III</td>
<td>MRI</td>
<td>Normal</td>
<td>NSAIADs, fentanyl patch, IVMP</td>
<td>Good response to IVMP</td>
</tr>
<tr>
<td>9</td>
<td>M/58</td>
<td>Pfizer (first dose)</td>
<td>Ipsilateral</td>
<td>5/30</td>
<td>II</td>
<td>MRI</td>
<td>ND</td>
<td>Oral prednisolone, pregabalin</td>
<td>Good response to IVMP</td>
</tr>
<tr>
<td>10</td>
<td>F/23</td>
<td>Pfizer (first dose)</td>
<td>Ipsilateral</td>
<td>10/11</td>
<td>V</td>
<td>MRI</td>
<td>ND</td>
<td>Oral prednisolone, pregabalin</td>
<td>Poor recovery by week 8</td>
</tr>
<tr>
<td>11</td>
<td>F/81</td>
<td>Pfizer (first dose)</td>
<td>Bilateral</td>
<td>15 NA</td>
<td>IV</td>
<td>MRI</td>
<td>Normal</td>
<td>Gabapentin, nortriptyline, NSAIADs</td>
<td>Poor recovery by month 6</td>
</tr>
<tr>
<td>12</td>
<td>M/39</td>
<td>Moderna (first dose)</td>
<td>Ipsilateral</td>
<td>7/14</td>
<td>IV</td>
<td>MRI</td>
<td>WBC 1, protein 76</td>
<td>IVMP followed by oral prednisolone, gabapentin</td>
<td>Poor recovery by week 8</td>
</tr>
</tbody>
</table>

*Values were expressed as cells/μL (WBC) and mg/dL (protein).
†Parsonage-Turner syndrome followed by weakness and wasting in the upper limb.2
23 Herein, we report on the clinical, radiological and laboratory features of 12 cases with PTS as described in the literature is limited to several case reports and a passive reporting system.2,3
time course of the immune response

been seven publications reporting 10 cases
motor-
phenotypes of pure sensory or painless classic form, but also observed atypical COVID-
previous reports, we found that PTS post adenoviral vector-vaccines, our observations implicate the reported cases (8/10) received mRNA vaccines, our observations implicate the

of ipsilateral brachial neuritis or whether investigate whether these local immune proposed the need for further research to

with case series, our observations suggest

that COVID-19 vaccines may be associated with PTS characterised by ipsilateral occurrence and possibly accompanied by reactive lymphadenopathy. Further studies are warranted to assess the causality and significance of the ipsilateral association.

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Competing interests None declared.

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Ethics approval This study involves human participants and was approved by the institutional review boards (IRBs) of Seoul National University Hospital (IRB 2110-049-1261), Seoul Metropolitan Government Boramae Medical Center (IRB 30-2021-122) and Ewha Womans University Seoul Hospital (IRB 2021-09-021). The participants gave informed consent to participate in the study before taking part.

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REFERENCES