Do not miss idiopathic pulmonary arteriovenous malformations in a case of brain abscess!

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Background

Pulmonary Arteriovenous Malformations (PAVMs)
- Right-to-left shunts with septic emboli go to brain → brain abscess
- Incidence: **1 in 2600 individuals**
- Abscess ~ 30% as cryptogenic
- Incidence of brain abscess with PAVMs up to **6.2%**

Hypothesis: **Identify PAVMs → Embolization → Prevent recurrence**

The objective of this study:
- To investigate the association between brain abscess and idiopathic pulmonary arteriovenous malformations (PAVMs)
  - When to suspect PAVMs among those brain abscess cases
  - PAVMs screening modalities
Methodology

We report 3 local brain abscess cases with PAVMs
- records under CDARS from Oct 2015 to Oct 2020 (total 5 years) in NTWC

Total 46 patients with brain abscess
3 (6.5%) cases identified

From literature research (PubMed), 13 patients with idiopathic PAVMs presented initially with brain abscess without prior diagnosis of PAVMs were described.

In our cluster, ~ 6.5% cases of brain abscess associated with PAVMs without prior diagnosis in last 5 years!
Brain abscess associated with PAVMs is NOT uncommon!
## Results

**Table 1 local cases summary**

<table>
<thead>
<tr>
<th>Age/Sex</th>
<th>Symptoms of PAVMs</th>
<th>Multiplicity of PAVMs</th>
<th>Multiplicity of brain abscess</th>
<th>Pathogenic bacteria</th>
<th>PAVM Embolization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case 1</strong> 57/F</td>
<td>Chronic mild dyspnoea</td>
<td>Single</td>
<td>Single</td>
<td>Streptococcus intermedius</td>
<td>Done</td>
</tr>
<tr>
<td></td>
<td>(*with underlying Cystic lung disease)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Case 2</strong> 55/F</td>
<td>Asymptomatic</td>
<td>Two</td>
<td>Single</td>
<td>i) Streptococcus intermedius; ii) Haemophilus aphrophilus</td>
<td>Done</td>
</tr>
<tr>
<td><strong>Case 3</strong> 52/F</td>
<td>Recurrent epistaxis</td>
<td>Two</td>
<td>Two</td>
<td>i) Streptococcus intermedius; ii) Pepto-streptococcus micros</td>
<td>Done</td>
</tr>
<tr>
<td></td>
<td>(*? HHT : only 2 out of 4 criteria)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**FIG.1 ISOLATED PATHOGENS**

- **No growth** 40%
- **Others** 14%
- **Streptococcus group** 46%

**FIG.2 SYMPTOMS OF PULMONARY AVMS**

- **Asymptomatic polycythemia** 7%
- **Respiratory symptoms** 27%
- **Asymptomatic** 66%

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**Key Message**

Positive isolates in local cases are ALL associated with **Streptococcus group**; But only contributed 46% among literature cases.

~ 40% cases yield no growth

Most idiopathic PAVMs are asymptomatic.
1. All local 3 cases have **NO** definite septic sources despite full ENT/Dental/ Cardiac work-up.

2. All yielded **Streptococcus species** bacteria.

3. All underwent endovascular embolization with **NO recurrence**.

4. Including present studies, total 16 cases of PAVMs presented initially with brain abscess are described.
   - 11/16 (68.8%) Most cases are free of respiratory symptoms.
   - 8/16 (50%) Half of cases yield streptococcus species bacteria and 7/16 (43.8%) of cases yield no growth

5. Transthoracic contrast echocardiography could be used for initial screening in cardiac work-up.

6. Further **contrast CT of the chest** provides definite diagnosis.

**Figure 3 hypothesized pathophysiology of brain abscess caused by PAVMs**
Conclusion

▷ PAVM is **NOT** a rare cause of brain abscess
▷ It can be manifested **WITHOUT** respiratory symptoms
▷ It need to be considered in those **brain abscess cases** **WITHOUT** definite sources **confirmed**
▷ There is a chance of PAVM even **NEGATIVE** culture found.