Andrology Services at HA – Past, Present and Future

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Content

• How is semen analysis done?
• Is it useful?
• Past
• Present
• Future
Aim of semen analysis

Provide indication of fertility potential

• Semen analysis is not a direct test of male fertility
• Fertility can only be demonstrated by a pregnancy
Semen analysis is simple to perform but is difficult to do well.
Is semen analysis useful?

World Health Organization (1999) reference ranges are based on expert opinion

The predictive value of is LIMITED
<table>
<thead>
<tr>
<th></th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume</td>
<td>1.5 ml</td>
</tr>
<tr>
<td>pH</td>
<td>$\geq 7.2$</td>
</tr>
<tr>
<td>Concentration</td>
<td>$15 \times 10^6$ /ml</td>
</tr>
<tr>
<td>Total count</td>
<td>$39 \times 10^6$ /ejaculate</td>
</tr>
<tr>
<td>Motility (&lt;1 hour)</td>
<td>32% progressive motility</td>
</tr>
<tr>
<td>Morphology</td>
<td>4%</td>
</tr>
</tbody>
</table>

- >4500 fertile men from several prospective, cross-sectional studies of semen quality
- Their partner conceived within 12 months after stopping use of contraception
- One complete semen sample from each man after 2–7 days of abstinence

Factors affecting predictive power of semen analysis

- Indirect markers of sperm function
- Variation of semen quality
  - >1 analyses per man
Variation of semen quality

WHO 2010
Factors affecting predictive power of semen analysis

• Indirect markers of sperm function
• Variation of semen quality
  • >1 analyses per man
• Inter- and intra-laboratory variation of semen analysis
Semen analysis is usually done manually and is subjected to inter- and intra-technician variation

Sperm morphology is the most subjective parameter
Variation of laboratory results

Pacey et al., 2005 Hum Reprod 21:1105–9
Training reduces variations

Bjorndahl et al. (2002) Hum Reprod 17:1299-305
Quality control is important

- Training reduces variation
- Appropriate standard operation procedure
- Internal quality control
- External quality control
Aim of semen analysis in QMH

identify unsuccessful treatment procedure

selection of appropriate treatment
Semen analysis is predictive in extreme cases

- Azoospermia
- Severe oligospermia
- Severe asthenozoospermia
- Globozoospermia
Cumulative pregnancy rate (98-00)

WHO normal morphology (%)

IUI

IVF
## Sperm morphology (WHO) & ICSI

<table>
<thead>
<tr>
<th></th>
<th>IVF</th>
<th>ICSI (&lt;5%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt;5%</td>
<td>&gt;5%</td>
</tr>
<tr>
<td>No. OPU</td>
<td>35</td>
<td>1158</td>
</tr>
<tr>
<td>Fert. Rate (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>=0</td>
<td>34.3</td>
<td>3.8</td>
</tr>
<tr>
<td>&lt;30</td>
<td>57.1</td>
<td>8.4</td>
</tr>
<tr>
<td>Mean</td>
<td>33.3</td>
<td>74.1</td>
</tr>
<tr>
<td>Embryo/transfer</td>
<td>2.1</td>
<td>2.7</td>
</tr>
<tr>
<td>Preg/transfer (%)</td>
<td>3.8</td>
<td>19.4</td>
</tr>
</tbody>
</table>
## Sperm morphology & ICSI

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. cycle</strong>*</td>
<td>784</td>
</tr>
<tr>
<td><strong>Fert. rate≤30%</strong></td>
<td></td>
</tr>
<tr>
<td>No. (%)</td>
<td>92 (12.0%)</td>
</tr>
<tr>
<td>No. with ICSI criteria</td>
<td>24 (3.1%)</td>
</tr>
<tr>
<td><strong>Fert. rate=0%</strong></td>
<td></td>
</tr>
<tr>
<td>No. (%)</td>
<td>42 (5.4%)</td>
</tr>
<tr>
<td>No. with ICSI criteria</td>
<td>13 (1.7%)</td>
</tr>
<tr>
<td><strong>ICSI criteria</strong></td>
<td><strong>TMC</strong></td>
</tr>
<tr>
<td></td>
<td>&lt;0.1M</td>
</tr>
<tr>
<td></td>
<td>WHO&lt;5</td>
</tr>
</tbody>
</table>

* 1st IVF cycle with oocytes >5 (excluding PGD)
# Semen analysis at HKU-QMH CARE

<table>
<thead>
<tr>
<th>Period</th>
<th>Criteria</th>
<th>Number of sample</th>
<th>Male infertility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.11.05 – 31-10.08</td>
<td>WHO 1999</td>
<td>5532</td>
<td>5479 (99%)</td>
</tr>
<tr>
<td>1.11.08 – 30.4.11</td>
<td>WHO 2010</td>
<td>4162</td>
<td>2089 (50%)</td>
</tr>
</tbody>
</table>
Semen analysis at HA hospitals (Past)

- Semen analysis is a diagnostic test
- Traditionally done by the Department of Pathology
- At Queen Mary Hospital, SA was done by both Pathology and IVF Centre.
<table>
<thead>
<tr>
<th>Hospital</th>
<th>No. of samples</th>
<th>IVF Centre</th>
<th>Pathology</th>
<th>Private lab.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queen Mary Hospital</td>
<td>~1600</td>
<td>~1600</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kwong Wah Hospital</td>
<td>650</td>
<td>650</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Prince of Wales Hospital</td>
<td>178-267</td>
<td>-</td>
<td>178-267</td>
<td>0</td>
</tr>
<tr>
<td>Princess Margaret Hospital</td>
<td>117-121</td>
<td>-</td>
<td>117-121</td>
<td>0</td>
</tr>
<tr>
<td>United Christian Hospital</td>
<td>~160-180</td>
<td>-</td>
<td>&lt;1/3</td>
<td>&gt;2/3</td>
</tr>
<tr>
<td>Tseung Kwan O Hospital</td>
<td>~40-50</td>
<td>-</td>
<td>~190</td>
<td>87-102</td>
</tr>
<tr>
<td>Queen Elizabeth Hospital</td>
<td>~190</td>
<td>-</td>
<td>0</td>
<td>~190</td>
</tr>
<tr>
<td>Pamela Youde Nethersole Eastern Hospital</td>
<td>87-102</td>
<td>-</td>
<td>0</td>
<td>87-102</td>
</tr>
</tbody>
</table>
Reasons for not sending to Pathology

- Setting for private lab better and more convenient
- Our Path Lab is not using the WHO 2010 criteria and interpretation is a problem
- Many patients have been seen in the private sector as well and SA have been arranged via their private doctors
- No service
- They (Pathology) admit they are not good at doing this.
Quality semen analysis in Pathology could be difficult

- Cost-effectiveness: Not many samples. SA is only one of the many diagnostic tests done in the laboratories.
- Not specialized in gamete assessment: SA is part of the training for embryologists but not necessarily for medical laboratory technicians.
- Rotation of staff in pathology laboratory: SA by dedicated and trained staff in IVF centres.
Semen analysis training in Hong Kong

- Self learning
- Not a usual teaching topic in medical laboratory sciences.
- HKU had provided HA commissioned training to HA units in 2006 and 2014.
- A practical in Assisted Reproduction Technology (Laboratory) module, Master of Medical Sciences, HKU
- Overseas training
- Continuous practice is important to keep the quality
Semen analysis at QMH

• Semen analysis done by 3 dedicated staff.
• Training
  – One-month training + assessment
• Internal quality control
  – within 10% variation
  – Monthly mean
• External quality control
  – Join proficiency program of College of American Pathologists.
Future andrology services at HA
A 2-phase reform of andrology services at HA

• First phase:
  – SA is centrally performed in the 3 IVF centres.
    • Patients’ convenience
    • Semen analyses have to be done within 1 hour after ejaculation.
  – The IVF centres provide training of SA to technical staff of other HA hospitals.
A 2-phase reform of andrology services at HA

• Second phase:
  – SA can be done by either the IVF centre or the pathology laboratory depending on individual hospital arrangement.
  – To maintain the standard and reliability of the service, a quality assurance program has to be implemented.
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