Volumetric Overload Shocks Cause the Acute Respiratory Distress Syndrome: The Plenary Evidence on Patho-Aetiology and Therapy

Ahmed N Ghanem*
Faculty of Medicine, Mansoura University, Egypt

*Corresponding author: Ahmed N Ghanem, Retired Consultant Urologist Surgeon, Faculty of Medicine, Mansoura University, Egypt

Abstract

The acute respiratory distress syndrome (ARDS) was reported in 1967. Volumetric overload (VO) of 12-14 litres (L) reported in every case but not incriminated in patho-aetiology [1-6]. Although prospective trials reported 3-10 L of retained fluid in surviving ARDS patients, VO has not been incriminated [7-8]. ARDS is attributed to sepsis, has a high morbidity, cost and mortality with no effective specific therapy [2-11]. The precise role of VO in patho-aetiology of ARDS and a specific effective therapy remain unknown. Here I show that VO complicates fluid therapy inducing shock (VOS) of two types: VOS 1 and VOS 2 depending on the type of fluid. Hyponatraemia characterises VOS 1 that is mistaken for a recognized shock and wrongly treated with further volume expansion complicating into VOS 2 causing secondary ARDS. It is known in urology as the transurethral resection of the prostate (TURP) syndrome or hyponatraemic shock.

Sodium-based crystalloids and colloids fluid therapy also induce VOS 2 causing primary ARDS. Both types of ARDS present with the multiple organ dysfunction syndrome (MODS). Cerebral features of coma, convulsions and paralysis predominate in VOS 1 or secondary ARDS. VOS 2 causes primary ARDS in which acute kidney injury (AKI) predominate. Trunk oedema, coagulopathy and excessive bleeding also occur. Many errors and misconceptions on fluid therapy mislead physicians into giving too much fluid in resuscitation of shock causing ARDS. Starling's law underlies all errors and dictates the faulty rules on fluid therapy using both liberal and conservative fluid regimen. Here I demonstrate how VO induce VOS causing ARDS. A new therapy is prescribed.
My Physics research on hydrodynamic of G tube [16,24,25] and physiological research [26] aimed to verify and prove Starling’s law is wrong reported 200124 and confirmed in 2017[25] and finalized in 202016. My clinical prospective study 20 on 100 patients among whom 10 developed the TURP syndrome as VO complicating fluid therapy (FT), reported in MD Thesis (1988) and article in 1990 (See Statistics under methods). This report advances the concept of VO over Time inducing VOS[12-15] causing the TURP syndrome, ARDS, acute kidney injury (AKI) plus other dysfunction that form the multiple organ dysfunction syndrome (MODS) (Table 1).

Table 1: shows the manifestations of VOS 1 of the TURP syndrome for comparison with ARDS manifestations induced by VOS 2.

<table>
<thead>
<tr>
<th>Cerebral</th>
<th>Cardiovascular</th>
<th>Respiratory</th>
<th>Renal</th>
<th>Hepatic &amp; GIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tingling</td>
<td>Hypotension</td>
<td>Cyanosis</td>
<td>Oliguria</td>
<td>Dysfunction:</td>
</tr>
<tr>
<td>SBB1</td>
<td>Dysrhythmia</td>
<td>APO</td>
<td>Renal failure or</td>
<td>SGOT ↑</td>
</tr>
<tr>
<td>COC2</td>
<td>CV Shock*</td>
<td>RA6</td>
<td>AKI9</td>
<td>Alkaline Phosph.</td>
</tr>
<tr>
<td>Convulsions</td>
<td>Cardiac Arrest</td>
<td>urea ↑</td>
<td>GIT symptoms.</td>
<td></td>
</tr>
<tr>
<td>Coma</td>
<td>Sudden Death</td>
<td>CPA7</td>
<td>Creatinine ↑</td>
<td>DGR10</td>
</tr>
<tr>
<td>PMBCI 3</td>
<td>Shock lung</td>
<td>Paralytic ileus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARDS</td>
<td>Nausea &amp; Vomiting</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SBB: Sudden Bilateral Blindness; COC: Clouding of Consciousness; PMBCI: Paralysis Mimicking Bizarre Cerebral infarctions but is recoverable on instant use of HST of 5%NaCl and/or NaCo2, and so is coma and AKI; FAM: Frothing Around the Mouth; APO: Acute Pulmonary Oedema; RA: Respiratory Arrest; CPA: Cardiopulmonary Arrest; ARDS: Occurs later on ICU; AKI: Acute Kidney Injury; DGR: Delayed Gut recovery; CV Shock: Cardiovascular shock of VOS reported here as VOS 1 and VOS 2; Anurria: That is unresponsive to diuretics but responds to HST of 5%NaCl and/or 8.4% NaCo2; AKI: Acute kidney injury also occurs the excessive bleeding at the surgical site and Leucocytosis occurred in the absence of sepsis and septic shock.

Starling’s law being wrong has resulted in many errors and misconception on fluid therapy during prolonged surgery and the resuscitation of shock and the acutely ill patients. This misleads physicians into giving too much fluid23 which induce VOS [12-16] that cause ARDS [16-19]. Volumetric overload (VO) may present with cardiac or respiratory arrest or both "cardiopulmonary arrest" immediately in theatre or ARDS later[16]. VOS are two types depending on the type of fluid inducing VO shock: VOS 1 is induced by sodium-free fluid such as 5% Glucose and/or 1.5% Glycine used as irrigating fluid during the transurethral resection of the prostate (TURP) surgery. It is known in urology as the TURP syndrome [20] or hyponatraemic shock [21].

Volumetric Overload Shock Type 1 (VOS 1)

This VOS 1 is induced by 1.5% Glycine absorption and/or 5% glucose infusion of about 3.5-5 L (>5% of body weight (BW)) causing severe condition characterized with acute dilution hyponatraemia (HN) [21,22,29-33]. Hyponatraemia has 2 nadirs and 2 paradoxes [29] making it dynamic and ilusive [30].

The 2 nadirs are: The first nadir is the immediate drop of serum sodium level as result of the extra-cellular fluid dilution that occurs during or immediately after surgery. The second nadir is that occurring later, within 24 hours, after water shift into the intracellular compartment causing spontaneous elevation of serum sodium level towards normal. Yet the clinical picture gets worse due to the generalized cellular oedema manifesting with MODS (Table 1). Also using sodium-based crystalloids and colloids solutions for treating VOS 1 may apparently correct serum sodium level but worsen VO inducing VOS2 and cause secondary ARDS. The paradoxes are: A pathological VO induces hypotensive shock of VOS [12-15] and AKI [34] which is paradoxical to the physiological response of volume replacement that treats the known hypotensive shock and induces diuresis [12-16].

VOS 1 currently has a lifesaving therapy of hypertonic sodium therapy (HST) of 5% NaCl or 8.4% NaCo2[12-15,22]. It may present with cardiac or pulmonary arrest or one or more of the other manifestations of MODS - being the new name for ARDS. The clinical manifestations include in addition to cardiac and respiratory features: coma with convulsions and paralyis, AKI32 and hepatic dysfunction. It also causes coagulopathies and excessive bleeding at the surgical site (Table 1). Multiple regression analysis in our prospective study [20] proved VO as the most significant factor in relation to morbidity of TURP syndrome (p=0.0001) (Figure 1 and Statistical analysis under Methods). In the case series study > 5 L (7%) and >7 L (10% BW) are significant to severe morbidity and mortality, respectively (Figure 2, Table 2).

Figure 1: shows the means and standard deviations of volumetric overload in 10 symptomatic patients presenting with shock and hyponatraemia among 100 consecutive patients during a cohort prospective study on transurethral resection of the prostate. The gained fluids were Glycine absorbed (Gly abs), intravenously infused 5% Dextrose (IVI Dext) Total IVI fluids, Total Sodium-free fluid gained (Na Free Gain) and total fluid gain in Litres. A mean of 3.5 (p=0.0001) litres VO occurred in symptomatic patients presenting with hypotensive shock, recognized as VOS1.

VOS 1 affects women too during the trans-cervical resection of endometrium due to 1.5% Glycine absorption, and during Caesarean section due to excessive 5% Glucose infusion [31]. VOS is always mistaken for one of the recognized shocks such as haemorrhagic and septic shocks thus it is wrongly treated with further volume expansion using sodium-based isotonic fluids. This induces VOS 2 and cardiopulmonary arrest that has no serum markers of HN and causes secondary ARDS in patients who survive a little longer.

Volumetric overload shock type 2 (VOS 2)

This VOS 2[12-15] is induced by massive infusion of sodium-based fluids (Crystalloids and colloids) such as normal saline,
Hartmann, plasma, plasma substitutes and blood, in any combination [35,36]. VOS 2 may complicate VOS 1 (Secondary VOS 2) or is induced by sodium-based fluid during FT for resuscitation of shock (Primary VOS 2) and the critically ill patients and prolonged surgery and presents with ARDS later. Volumetric gain of 12-14L of sodium-based fluids reported in the first article on ARDS1. Discovery of VOS has resolved the puzzles of three conditions namely: the TURP syndrome, HN and ARDS[19]. The exact patho-aetiologies were identified, and curative therapy was found. These are real serial killers of hundreds of thousands of surgical and medical patients each year all over the world. Not only these most serious conditions preventable but also possibly curable when occur inadvertently and treated promptly.

Ethics and Statistics

The pragmatic prospective cohort study was done during the period Dec. 1985- Dec. 1988 when I worked as research fellow. The study was done during the year 1986-7. The objective of the study and MD Thesis was trying to “understand the TURP syndrome”;

Figure 2: shows volumetric overload (VO) quantity (in litres and as percent of body weight) and types of fluids. Group 1 was the 3 patients who died in the case series as they were misdiagnosed as one of the previously known shocks and treated with further volume expansion based on the conservative approach. They had the clinical picture of VOS 2 and ARDS. Group 2 were 10 patients from the series who were correctly diagnosed as volumetric overload shock (VO 1) and treated with hypertonic sodium therapy (HST). Group 3 were 10 patients who were seen in the prospective study and subdivided into 2 subgroups; Group 3.1 of 5 patients treated with HST and Group 3.2 of 5 patients who were treated with "guarded" volume expansion using isotonic crystalloids/plasma/blood of the standard conservative approach but much less volume- being "Guarded". One patient from the conservatively treated group 3.2 developed ARDS with coma, convulsions and bizarre paralysis on the second postoperative day. He was seen by a Neurologist and diagnosed as cerebrovascular accident. He fully and immediately recovered from ARDS, coma and paralysis. Recovery from AKI that was unresponsive to loop diuretics occurred with the infusion of HST after passing 4.5L of urine. Groups 2 and 3.1 responded similarly to HST. (Reproduced with the permission of author from open access journal)

Table 2 shows the data of the 23-patients of the case series study [11]; the second clinical study on which this article is based. The significant changes of serum solute contents are shown in bold font with the corresponding p-value. Most of the patients showed manifestation of ARDS (Table 1) of which the cerebral manifestation predominated, being on initial presentation (Regional Anaesthesia) and representation of VOS 1 (General Anaesthesia). However, most patients were given large volume of saline that elevated serum sodium to near normal while clinical picture became worse. They suffered VOS2 that caused ARDS. The VO of patients to whom these data belongs are shown in (Figure 3), Please note the elevation of urea and unurea of Group 1 who died indicated AKI. Elevations on Bilirubin and AST indicated hepatic dysfunctions. White cell count (WCC) elevation indicated inflammatory response of VOS 2 in ARDS or SIRS in the absence of sepsis.

<table>
<thead>
<tr>
<th>A</th>
<th>B C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gr 1</td>
<td>Gr 2</td>
<td>Gr 3</td>
<td>Gr 3.1</td>
<td>Gr 3.2</td>
<td>Normal units</td>
</tr>
<tr>
<td>2</td>
<td>Number of patients</td>
<td>3</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Age</td>
<td>71</td>
<td>70</td>
<td>75</td>
<td>72</td>
<td>78</td>
</tr>
<tr>
<td>4</td>
<td>Body Weight (BW)</td>
<td>69</td>
<td>70</td>
<td>70</td>
<td>71</td>
<td>65</td>
</tr>
<tr>
<td>5</td>
<td>Postoperative Serum Solute Concentrations:</td>
<td>-</td>
<td>Preoperative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Osmolarity</td>
<td>271</td>
<td>234</td>
<td>276</td>
<td>282</td>
<td>271</td>
</tr>
<tr>
<td>7</td>
<td>Na+</td>
<td>110</td>
<td>108</td>
<td>120</td>
<td>129</td>
<td>121</td>
</tr>
<tr>
<td>8</td>
<td>Ca++</td>
<td>1.69</td>
<td>1.79</td>
<td>1.85</td>
<td>1.84</td>
<td>1.86</td>
</tr>
<tr>
<td>9</td>
<td>K+ (P&lt;0.5)</td>
<td>5.6</td>
<td>4.8</td>
<td>5</td>
<td>4.9</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>Co2 (P&lt;0.002)</td>
<td>23</td>
<td>23</td>
<td>25.5</td>
<td>24</td>
<td>26.4</td>
</tr>
<tr>
<td>11</td>
<td>Glucose</td>
<td>13.2</td>
<td>17.3</td>
<td>16.4</td>
<td>15.9</td>
<td>16.9</td>
</tr>
<tr>
<td>12</td>
<td>Urea (P&lt;0.0726)</td>
<td>26.5</td>
<td>9</td>
<td>6.6</td>
<td>6.8</td>
<td>6.4</td>
</tr>
<tr>
<td>13</td>
<td>Bilirubin (P&lt;0.005)</td>
<td>19</td>
<td>16</td>
<td>8</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>14</td>
<td>AST</td>
<td>124</td>
<td>32</td>
<td>20</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>15</td>
<td>Protein</td>
<td>43</td>
<td>52</td>
<td>48</td>
<td>44</td>
<td>52</td>
</tr>
<tr>
<td>16</td>
<td>Albumin</td>
<td>23</td>
<td>30</td>
<td>30</td>
<td>28</td>
<td>32</td>
</tr>
<tr>
<td>17</td>
<td>Hb (P&lt;0.0018)</td>
<td>119.3</td>
<td>127.9</td>
<td>114.5</td>
<td>105.2</td>
<td>123.8</td>
</tr>
<tr>
<td>18</td>
<td>WCC (P&lt;0.005)</td>
<td>18.9</td>
<td>16.2</td>
<td>7.5</td>
<td>7.8</td>
<td>7.2</td>
</tr>
<tr>
<td>19</td>
<td>Glycine</td>
<td>10499</td>
<td>293</td>
<td>µmol/l</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Therapy</td>
<td>CT</td>
<td>HST</td>
<td>Random</td>
<td>HST</td>
<td>CT @</td>
</tr>
<tr>
<td>21</td>
<td>Outcome</td>
<td>Death</td>
<td>Full rec</td>
<td>Full rec</td>
<td>Full rec</td>
<td>Morb. @</td>
</tr>
</tbody>
</table>

reported 30 years ago in 1990 at the British Journal of Urology (BJU) then and now International (BJUI) [20]. It was conducted at the District General Hospital, Eastbourne, United Kingdom where I worked previously as senior house officer (SHO). The Trial started after approval of the Ethical Medical Committee. The informed consent was obtained from all participating patients.

The investigation was exploratory, pragmatic and non-interference study. The surgery was done routinely as in normal standard clinical practice. The TURP surgery was performed by 2 eminent and experienced Consultant Urologists, the late Mr K. C. Perry and Mr John P. Ward who performed the procedure at the highest standard. Anaesthesia and fluid therapy were given by consultant anaesthetists as per standard practice. My role as Research Fellow was limited to obtaining the Informed Consent from patients and collecting all the relevant patients’ data recorded in the aesthetic, theatre and hospital records. The investigation and article won the Princess Alice Memorial Award 1988.

Therapy of ARDS

Prevention

Based on the above discussion, ARDS is an iatrogenic complication of fluid therapy in hospital, never in community, that is overlooked and underestimated. Being iatrogenic; means


DOI: 10.46718/JBGSR.2020.01.000024
it is preventable. In order to prevent VOS and ARDS a limit to the maximum amount of fluid used during shock resuscitation or major surgery must be agreed upon. Professor Hahn [37] found that infusing 2 L of saline to human volunteers produces symptoms. Infusing >3 L is pathological. More than 5 L is associated with deleterious morbidity [38,39] So, the maximum volume of fluids that can be infused safely to an adult patient is 3 L which is the daily fluid requirement and no more fluid of any kind is given for 24 hours except replacing the actual loss that does not include urine loss. The patient should be on a weighing scale every day from hospital admission till discharge or death. Any retained volume of fluid above his body weight on admission is pathological. On using CVP for monitoring fluid therapy, please refrain from persisting to elevate CVP to levels above 12 and up to 18-22cm saline. This is a major cause for inducing VO and VOS and ARDS during shock resuscitation, particularly septic shock [40]. Look up any physiology textbook to find out that the normal CVP is 0 and it swings between -7 and +7cm saline which is the level that should be aimed at in monitoring fluid replacement in shock of sepsis, trauma and bleeding, acutely ill and during surgery. Elevating CVP is not synonymous with elevating arterial pressure.

If hypotension develops later during ICU stay, inotropic drugs, hydrocortisone 200mg and HST should be used. The latter restores the pre-capillary sphincter tone (peripheral resistance) so that the capillary works as normal G tube again16, but NO isotonic crystalloids or colloids infusions of above the daily fluid requirement. If persistence with the current liberal regimen of isotonic crystalloids or colloids infusions of above the daily fluid requirement and no more fluid of any kind is given for 24 hours except replacing the actual loss that does not include urine loss. The patient should be on a weighing scale every day from hospital admission till discharge or death. Any retained volume of fluid above his body weight on admission is pathological. On using CVP for monitoring fluid therapy, please refrain from persisting to elevate CVP to levels above 12 and up to 18-22cm saline. This is a major cause for inducing VO and VOS and ARDS during shock resuscitation, particularly septic shock [40]. Look up any physiology textbook to find out that the normal CVP is 0 and it swings between -7 and +7cm saline which is the level that should be aimed at in monitoring fluid replacement in shock of sepsis, trauma and bleeding, acutely ill and during surgery. Elevating CVP is not synonymous with elevating arterial pressure.

If hypotension develops later during ICU stay, inotropic drugs, hydrocortisone 200mg and HST should be used. The latter restores the pre-capillary sphincter tone (peripheral resistance) so that the capillary works as normal G tube again16, but NO isotonic crystalloids or colloids infusions of above the daily fluid requirement. If persistence with the current liberal regimen of Early Goal-Directed Therapy (EGDT) and conservative Bolus FT requirement and no more. After giving HST over one hour using the CVP catheter already inserted, the patient recovers from AKI and produces through a urinary catheter massive amount of urine of 4-5L as you watch. This urine output should not be replaced. Just observe the patient recovering from his AKI, coma and ARDS and asks for a drink. This is done in addition to the cardiovascular, respiratory and renal support on ICU. Patients with AKI on dialysis, the treating nephrologist should aim at and set the machine for inducing negative fluid balance.

The HST of 5%NaCl and/or 8.4%NaCO₃ is given in 200 ml doses over 10 minutes and repeated. I did not have to use more than 1000 ml during the successful treatment of 16 patients. Any other hypertonic sodium concentration is not recommended. A dose of intravenous diuretic may be given but it does not work in a double or triple the normal dose. A dose of 200mg of hydrocortisone is most useful. Antibiotic prophylactic therapy is given in appropriate and adequate doses to prevent sepsis and septic shock. No further fluid infusions of any kind crystalloids, colloids and blood is given. The urinary loss should not be replaced as this defeats the objective of treatment.

I would recommend a small pilot prospective controlled cohort study on 100 patients as a start to try HST in established ARDS cases that would be something to look forward to reading a report on it, hopefully soon. No multicentre trial or high expenses is needed for that. Not much time is required either. If you can’t do it on a hundred patients, you probably can’t (as Mr JP Ward put it to me before the start of our prospective study [20]. I can assure the investigators that no harm will come to patients. It is a guaranteed win bit; you may win but you do not lose anything. In the worst-case scenario, the patient may not respond because of chronicity of ARDS or after sepsis complicates ARDS and gets the capillary damage established. As the author of all self-referenced articles here, published in open access journals, and as copyright holder I give open permission to any interested investigator to use any of my articles as template, particularly recommended article

Table 3 shows the multiple regression analysis of total per-operative fluid gain, drop in measured serum osmolality (OsmM), sodium, albumin, Hb and increase in serum glycine occurring immediately post-operatively in relation to signs of the TURP syndrome. Volumetric gain and hyposmolality are the only significant factors. The table was produced on an Apple® Mackintosh® using Stat View® statistical package 35 years ago. (Reproduced with the permission of authors and editor of BJU Int. from reference 20) Though this data is >38 years old results remain as good and as valid as today or tomorrow.

<table>
<thead>
<tr>
<th>P</th>
<th>T Value</th>
<th>Std. Value</th>
<th>Std. Err</th>
<th>Value</th>
<th>Parameter Intercept</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0001</td>
<td>3.721</td>
<td>1.044</td>
<td>0.228</td>
<td>0.847</td>
<td>Fluid Gain (l)</td>
</tr>
<tr>
<td>0.0212</td>
<td>2.42</td>
<td>-0.375</td>
<td>0.014</td>
<td>0.033</td>
<td>Osmolality</td>
</tr>
<tr>
<td>0.0597</td>
<td>1.95</td>
<td>0.616</td>
<td>0.049</td>
<td>0.095</td>
<td>Na+(C_B)</td>
</tr>
<tr>
<td>0.4809</td>
<td>0.713</td>
<td>0.239</td>
<td>0.087</td>
<td>0.062</td>
<td>Alb(C_B)</td>
</tr>
<tr>
<td>0.2587</td>
<td>1.149</td>
<td>-0.368</td>
<td>0.246</td>
<td>-0.282</td>
<td>Hb(C_B)</td>
</tr>
<tr>
<td>0.4112</td>
<td>0.832</td>
<td>-0.242</td>
<td>5.98E-05</td>
<td>-4.97E-05</td>
<td>Glycine(C_B)</td>
</tr>
</tbody>
</table>

Hypertonic sodium therapy of 5%NaCl and/or 8.4%NaCO₃ has truly proved lifesaving therapy for the TURP syndrome and acute dilution HN [21,22] as well as Secondary VOS 2 that complicates fluid therapy of VOS 1 causing ARDS. It works by inducing massive diuresis; being a potent suppressor of anti-diuretic hormone. My experience in using it for treating established ARDS with sepsis and primary VOS 2 that causes ARDS is not tested. However, evidence on HST suggests it will prove successful if given early, promptly and adequately to ARDS patients while refraining from any further isotonic crystalloid or colloid fluid infusions using saline, HES and/or plasma therapy- just give the normal daily fluid requirement and no more. After giving HST over one hour using the CVP catheter already inserted, the patient recovers from AKI and produces through a urinary catheter massive amount of urine of 4-5L as you watch. This urine output should not be replaced. Just observe the patient recovering from his AKI, coma and ARDS and asks for a drink. This is done in addition to the cardiovascular, respiratory and renal support on ICU. Patients with AKI on dialysis, the treating nephrologist should aim at and set the machine for inducing negative fluid balance.

The HST of 5%NaCl and/or 8.4%NaCO₃ is given in 200 ml doses over 10 minutes and repeated. I did not have to use more than 1000 ml during the successful treatment of 16 patients. Any other hypertonic sodium concentration is not recommended. A dose of intravenous diuretic may be given but it does not work in a double or triple the normal dose. A dose of 200mg of hydrocortisone is most useful. Antibiotic prophylactic therapy is given in appropriate and adequate doses to prevent sepsis and septic shock. No further fluid infusions of any kind crystalloids, colloids and blood is given. The urinary loss should not be replaced as this defeats the objective of treatment.

The HST of 5%NaCl and/or 8.4%NaCO₃ is given in 200 ml doses over 10 minutes and repeated. I did not have to use more than 1000 ml during the successful treatment of 16 patients. Any other hypertonic sodium concentration is not recommended. A dose of intravenous diuretic may be given but it does not work in a double or triple the normal dose. A dose of 200mg of hydrocortisone is most useful. Antibiotic prophylactic therapy is given in appropriate and adequate doses to prevent sepsis and septic shock. No further fluid infusions of any kind crystalloids, colloids and blood is given. The urinary loss should not be replaced as this defeats the objective of treatment.

I would recommend a small pilot prospective controlled cohort study on 100 patients as a start to try HST in established ARDS cases that would be something to look forward to reading a report on it, hopefully soon. No multicentre trial or high expenses is needed for that. Not much time is required either. If you can’t do it on a hundred patients, you probably can’t (as Mr JP Ward put it to me before the start of our prospective study [20]. I can assure the investigators that no harm will come to patients. It is a guaranteed win bit; you may win but you do not lose anything. In the worst-case scenario, the patient may not respond because of chronicity of ARDS or after sepsis complicates ARDS and gets the capillary damage established. As the author of all self-referenced articles here, published in open access journals, and as copyright holder I give open permission to any interested investigator to use any of my articles as template, particularly recommended article

Figure 3: shows serum concentrations of Serine, Glycine and Alanine at the Pre-op., Post-op. and 24-hour post-operatively.


DOI: 10.46718/JBGSR.2020.01.000024
Ahmed N Ghanem, Volumetric Overload Shocks Cause the Acute Respiratory Distress Syndrome: The Plenary Evidence on Patho-

Methods

I thank the late Professor GD Chisholm, Editor of British Journal of Urology for reporting my article [19] and a nice encouraging letter. Many thanks also to the late Dr, David Horrobin, physiologist who was the editor-in-chief of the journal Medical Hypotheses and founder in 1975 until his death in 2003 for accepting my article [23] free of charge. Many thanks to the late Dr, Eric Neil, physiologist author of Samson Write Textbook of Physiology for a nice encouraging letter. Many thanks also go to Designer Engineer Peter Holder of Eastbourne who provided endless supply of G tubes free of charge before 1985. I thank Khaled A Ghanem, MBChB for his input in editing this article, for buying me a new Laptop and Office 365. I thank Salma A Ghanem, MBChB, for help with constructing Table 2 and for payment of $200 on my behalf to the scamsters who ripped me of it posing as MBChB, for help with constructing my son Khaled [40].

I also like to thank the Internet people, Google for its magic and for teaching me all the relevant Urologists, District General Hospital, Eastbourne, UK for teaching me the Urology I know, and for offering me the post of registrar in 1983 without any concern, comments or remark. The statistical package used for the statistical analysis did not complain either.

I followed and investigated that link over the years. This VO was made a pledge to the dead patients to find out how and why such volumetric overload (VO) occurred and what is its role in the patho-aetiology of the TURP syndrome? I later realized the VO link between TURP syndrome and ARDS, identified here as VOS. The VO link is the hydrodynamic of the G tube. Discovery of VOS has resolved the puzzles of TURP Syndrome, HN and ARDS. A new therapy for ARDS using HST of 5%NaCl and/or 8.4%NaCO3 is recommended.

Acknowledgements

I thank the late Professor GD Chisholm, Editor of British Journal of Urology for reporting my article [19] and a nice encouraging letter. Many thanks also to the late Dr, David Horrobin, physiologist who was the editor-in-chief of the journal Medical Hypotheses and founder in 1975 until his death in 2003 for accepting my article [23] free of charge. Many thanks to the late Dr, Eric Neil, physiologist author of Samson Write Textbook of Physiology for a nice encouraging letter. Many thanks also go to Designer Engineer Peter Holder of Eastbourne who provided endless supply of G tubes free of charge before 1985. I thank Khaled A Ghanem, MBChB for his input in editing this article, for buying me a new Laptop and Office 365. I thank Salma A Ghanem, MBChB, for help with constructing Table 2 and for payment of $200 on my behalf to the scamsters who ripped me of it posing as conference organizers.

I thank Mr Brian J Stoodley and Mr Peter Brooks, Consultant surgeons for offering me the registrar post in 1983 without attending the interview being at FRCS examination at the time and for teaching me all the surgery I know. Many thanks go to Mr JP Ward and Mr KC Perry, Consultant Urologists, District General Hospital, Eastbourne, UK for teaching me the Urology I know, and for offering me the post of research fellow without an interview in order to do the prospective study [19].

I also like to thank the Internet people, Google for its magic Chrome® and Google Scholar® programs, and the people behind the wonderful PubMed, NLM & NCBI for being most helpful over the years; putting such huge amount of information at the researcher’s finger tips. I like to thank Apple® Computers for inventing the Macintosh® before 1985 and Stat View® 512+ Statistical package; both made analysing the data of the prospective study absolute fun back before 1988 absolute fun. Thanks also to Picasa 3 for keeping and retrieving my photos. Now I use Laptop and Microsoft Office 365 gifted to me in 2019/2020 by my son Khaled [40].

Methods

Ethics and Statistics

The investigation was also approved by Mansoura University, Faculty of Medicine. and The Institute of Urology and Nephrology Centre, Mansoura, Egypt to be presented as MD Thesis under supervision of Professor M. A. Ghoneim from Egypt and Mr J. P. Ward from UK. I consulted two statisticians; one from UK who came specially to see me from London before the start of the study, and the other from Egypt before analysing the data. Before the start of the study, the comprehensive literature [41] review demonstrated an incidence of the TURP syndrome of 17-24%, with a mortality of 0.5-1.5%. A previous similar study done also under the supervision of the above mentioned 2 consultants but different investigator (Rhymer et al BJU. 1985) reported 7% incidence and 1% mortality of TURP syndrome among the 100 patients studied [42]. Of the consulted statisticians none expressed any concern, comments or remark. The statistical package used for the statistical analysis did not complain either.

The study was started, and I gathered the data on time, stored and analysed it on my "(Mackintosh SE, Apple computer Ltd) using Microsoft office" Excel® and Stat View 512+, Brain Power Inc" statistical package. Here is what I wrote then under the heading "Patients and methods as well as Statistical analysis" of this article using simple copy and paste, reproduced from reference 20. Our prospective Trial had the clear objective of identifying the role of Volumetric Overload (VO) in the patho-aetiology of SHOCK of TURP syndrome- as based on the finding of the post-mortem examination of 3 patients who died after TURP, previously (Figure 3, Table 2).

They were literally drowned internally with 3L of fluids in the peritoneal cavity, similar volume from both pleura and congested swollen organs with gross trunk oedema. This is when I silently made a pledge to the dead patients to find out how and why such volumetric overload (VO) occurred and what is its role in the patho-aetiology of the TURP syndrome? I later realized the VO link between TURP syndrome and ARDS, identified here as VOS.

Statistical analysis and Statistical Power of 100 patients!

Data were analysed statistically using an Apple computer (Macintosh SE) with a commercially available database and statistical packages (Stat View 512+, Brain Power Inc.). Patients served as their own controls by a comparison of their pre- and post-operative findings. Data are presented as the mean and standard deviation (SD). Student’s t test, multiple regression analysis and x2 tests were used for comparative Statistical analysis.

The Reader Should Observe the Following:

The objective endpoint of our trial for MD Thesis and article was trying to "understand the TURP syndrome" identifying the role of VO in the pathogenesis of shock of the TURP syndrome. This was clearly shown in the titles of both MD Thesis and article [20]. Sepsis and septic shock as well as haemorrhagic shocks were excluded; by negative urine culture in all patients and negative blood cultures in symptomatic cases- thus excluding sepsis and septic shock. The blood loss recovered by Cell Saver Mark IV was <1 unit of blood in symptomatic TURP syndrome cases- thus excluding haemorrhagic shock. The precise VO was measured, and the type of fluid was recorded. The patients presented with shock to anaesthetists and surgeons in theatre and with encephalopathy...
coma next day to physicians among MODS clinical features (Table 1). The cardiovascular (CVS) shock of the TURP syndrome is VOS 1 and the CVS was in a state of hypervolaemia during the shock- frequently reported by Hahn but attributed to one of the recognized shocks or Glycine toxicity.

The choice of 100 patients was based on being the same number of patients in the study done at the same department, previously [42]: Please compare patients and methods and Statistical analysis of the 100 patient Trial with Hahn’s study of 12 patients [43] reported side by side to our prospective study [20]. In the above 2 studies, Hahn studied 12 patients of whom 10 (83.3%) developed the TURP syndrome. Rhymer reported 100 patients among whom there was 7% morbidity and 1% mortality of TURP syndrome while Ghanem and Ward reported 100 patients of whom 10 (10 %) developed the morbidity of TURP syndrome with no mortality- one patient was saved from certain death. Hahn did not mention the incidence of mortality in the above reference. Is this enough to calculate the Power of Statistics?

If this is not enough, please read self-references, MD Thesis and/or the Book on VOS, if you cannot find it please let me know- last time I heard from the publisher he said it has been translated to 8 languages [44]: Should the above data prove insufficient and you desperately want the raw data, it may justify a visit to the 35-year old Mackintosh under my bed. The result of the above trials (Rhymer1985 and Hahn 1990) made me wonder: What is the role of VO that may complicate fluid therapy in pathogenesis of ARDS?

Mean time the results of the G tube study were concluded and reported in 2001. The search began then and has continued till today for the role of VO in the patho-aetiology of ARDS. It took me 38 years to resolve the puzzle of ARDS, waiting patiently till today for the role of VO, a patho-aetiology of ARDS. It took me 8 years to resolve the puzzle of ARDS, waiting patiently for others to report their VO results and to see this report in a reputable medical Journal that is listed in PubMed. Despite trying as hard as I could, my articles have been repeatedly rejected and I am not quite there yet as I write! Never communicated with Robert Hahn since our “HELLO-GOODBYE” MEETING IN CAIRO 1990 UNTIL RECENTLY ABOUT 6 WEEKS AGO. Ever since he started reporting on Volume Kinetics, I said to myself: "it is about time to remind him of VO and G tube?" I wondered then about what he would make of the VO concept and G tube results. Having realized that he was not aware of my contributions based on the negative PubMed search, I sent him a selected sample of articles to read and my whole list of references to choose from. His reply is: "I am impressed." I also reciprocate.

Meanwhile I also tried to report the G tube article [16] in a physiological journal. It was repeatedly rejected. Now it has been reported [4]. Communication with an Editor of a Physiology Journal to report a letter to the editor on "Why Starling's law is wrong? " was also rejected.

Conflict of interest Declaration
The author declares none.

I am now retired since 2010 from clinical practice and everything else while living in Egypt on a small but adequate pension from UK. I have given up on all material possessions, including property and money, handing it all to my wife Nanah Abdulatif Kamel who has more sense than I on financial issues and continue to look after me well. I am living very much like Mahatma Gandhi now. I deal with money no more, neither give nor take and have no debit or credit cards either. I am happy and content with my plate of food, lots of tea and cigarettes all provided by my wife who took control and responsibility of the family’s financial affair. I have seen and obtained everything I wanted from life. I go out for two hours once every week on Friday to meet with friends at a local social club.

The only interest that I practice and shall continue to practice if I remain alive and able is scientific medical reading and writing on my Laptop connected to the Internet that keeps me busy. This is done solely for the purpose of serving the scientific medical community providing it with knowledge that I believe will help the practicing physicians practice better precise medicine and above all, for the sake of saving patients' lives or alleviating pain and misery of others as well as guide future research. When an article of mine is acceptable format, I send it to one of the top physiological, medical and/or surgical journal, one after the other. When it is rejected, I try another, but all have rejected my multiple submissions giving the reason they can only accept 10-15% of the articles they receive, or in their judgment the article does not interest readers. Then the article is sent to an Open Access journal without any further editing.

All my articles written so far have been accepted by various Open Access Journals; 53 articles in total including 3 in the press. I also receive tens of genuine journal’s invitation to submit a manuscript free of APC, but I can’t do as I do not have enough articles to do so. All Open Access journals that accepted my articles do so although I do not pay them any fees. This is because I cannot afford it on one hand, and also to prevent future accusation of being published by paying money which may represent a conflict of interest. The only problem with Open Access Journals that I must complain about is that they are not listed in PubMed so far. On my last search on PubMed, out of 50 articles reported in Open Access Journals, PubMed returned (0). Thai is the reason our publications are not known to peers, authors and other researchers/investigators who rely on PubMed. I plead with NBCI and PubMed to register these journals soon or at least to register my publications when this article got published by this Journal.

Conferences, Congresses and Summits I also get dozens of email invitations to attend conferences congresses and summits. After they accept the abstracts and ask me to register, I explain that I cannot afford to attend unless I am fully sponsored for the cost of travel, hotel and registration. Then, they offer a discount thinking I am bargaining with them, but I am not bargaining. I apologize for not attending and the matter ends at that. I attended a cardiovascular conference in London March 2017 when I was sponsored by my wife Nana and daughter Salma. There were 6 people in the audience room. That was an improvement to what I faced in 1990 at a Urological conference in Cairo when there was 3 people in the audience room! I paid to organizers $1200 that was a lot of money in those days. The attendances were 3 people I personally invited. So, London Conference was an improvement! Regarding my presentation at Cairo. Robert’s presentation was on the TURP syndrome in the main hall with full audience. My presentation was another time on VOS in a side room with only 3 friends of mine I personally invited to attend.

Out of embarrassment and during the presentation my mind froze and kept talking out of control in order to finish. I ran out of time and could not hear the Chairman telling me to stop. The
Chairman, the Committee and the audience walked out of the room while still taking. I went to my hotel room and cried. This is how I gained immunity against any further rejection. In that meeting I tried to tell Robert about the G tube, but he shunned it then. This was the only time I meet Professor Robert Hahn and I have not seen or communicated with him ever since. About a month ago I sent him a sample of my reports in pdf format and the whole list of my reported articles. Hahn and I became friends, but I could not interest him to look at the G tube, and it was mentioned in the discussion of my article placed side by side with Hahn’s article.

“After a Successful conference in 2019 at Tokyo, Japan, with great vanity and honour we would like to announce “Scholars World Heart Summit” held by Scholars conferences during July 13-14, 2020 at London, UK. “This is the last ever conference I shall attend on the family’s expense will be a “Scholars World Heart Summit” held by Scholars conferences in London 13-14 July 2020, when I shall deliver 2 presentations on the subjects of VOS and G tube. After negotiations, I shall also be paying the registration fees of $200 only on arrival to the event not before. This is because I have been ripped off $200 paid using my daughter Salma’s credit card by scam professionals posing as conference organizers with a web site and all where I paid the money on the promise they will pay for everything else, including airplane tickets.

They stole the money and vanished without a trace. My wife told me repeatedly from the beginning that it is scam, but I did not imagine they will come to the medical science arena. I ask the authority in London to chase them, destroy their web site on the Internet, recover Salma’s $200 dollars and take them to court. This is mentioned to warn fellow Conference speakers. However, if I get invited in future to deliver a presentation and the organizers agreed to fully sponsor me, I shall happily accept and deliver as there is no conflict of interest in doing so. Travelling itself has taxing enough effect on my health but I shall bear that. The same goes son who also gets invitations. I am a board member and reviewer to many Journals and senior editor to one journal.

Limitations of the study
The author declares none.

The evidence provided in this article appears heterogeneous and disjointed, but only at first look. When the reader finished reading the discussion, he/she will understand that such heterogeneous evidence is mandatory to prove the objectives expressed in the title; VOS cause ARDS. The prospective trial is part of the presented evidence necessary for proving the endpoints of the article. Another limitation is perhaps because it is based on clinical prospective trial done >33 years ago. The trial was exploratory pragmatic non-invasive prospective study done with endpoint of "understanding the TURP syndrome" and all conditions related to fluid therapy complications in hospitals. The discussion addresses this issue and more. The updated references are selected from a huge number on ARDS as based on a previous peer reviewer of another journal’s concerns and criticisms of a previous version of the article presented here and an updated PubMed and Google Scholars searches.

The prospective trial is reproducible by any interested investigator who works at any general hospital or research Centre that uses 1.5% Glycine as irrigating fluid for the TURP procedure. But, he needs to familiarize himself with the ideas, concepts and discoveries. For centres that shifted to use of TUR in saline (TURIS) as irrigating solution for any endoscopic surgery, the serum marker of hypernatremia will no longer occur but watch out for a new source of classical ARDS cases induced by crystalloids when the irrigating saline fluid is absorbed in large volume. Another exception where an investigator may not be able to reproduce the results of the prospective study is when the TURP surgery is performed by a highly expert and swift Urologist in doing the resection operation in a short time! A professor from London reported this negative result in BJU. When I asked why is that and why did they abort the study after the 36TH patient? A reply was: "He is so brilliant Urologist Surgeon and so clever resection expert that his Scissors and Resectoscope have eyes that can see" I agree, but he could not see the importance of the TURP syndrome.

The power of study was not calculated before the start of the trial. None of the 3 statisticians who were consulted at that time, one from London before the start of the study, one from Egypt after the study was completed and before analysing the data, and the BJU journal’s statistician after submitting the article to The Editor of BJU [11]. Raised this issue. The Stat View 512+ on the Apple Mackintosh did not complain either and delivered statistical results with high significance (Results below with Figures and Tables 2 and 3 and (p<0.0001). Perhaps one of the contemporary statisticians such as this Journal’s may be able to calculate the statistical power of this or a future similar study from the data presented here. If it is necessary to re-examine the raw data again, it may justify a visit to the 35-year old Mackintosh under the bed. When this article with the prospective trial is statistically approved it should set the standard for most cost-effective trials in the future that deliver results quickly at minimum cost.

Authors contributions
There is only one author for this article.

Competing Interest declaration
None declared by the author.

Statistical Power

Patients and Methods
This is the text on statistical analysis and ethics of the prospective study by Ghanem and Ward reported at BJU 199020."A prospective study of 100 patients undergoing TURP was carried out with approval of the Medical Ethical Committee. A standard procedure was performed, using an irrigating resectoscope (Storz), 1.5% glycine irrigating fluid (at a height of 80 cm above the heart) and suction drainage (Haemodinetics Cell saver Mark IV), which measured blood loss. The absorbed volume of 1.5% glycine was the difference between the volume used and returned. Bumetanide 1 mg was given at the end of the procedure. The volume and type of per- and 24-h post-operative intravenous fluids infused were recorded. Pre- and post-operative urinary cultures were performed on all patients and blood cultures were done on those showing signs of post-operative circulatory shock. Blood electrolytes, serum osmolality, glycine, alanine and serine amino acids were measured on admission to hospital, after anaesthetic induction, on termination of the procedure and on the first post-operative morning. Further measurements were carried out on symptomatic patients, who were randomized between hypertonc 5% sodium chloride and conservative treatment. The osmolality of fluids used in this study were: 1.5% glycine 196, Hartmann’s 257, normal saline 287 and 5% dextrose 297 mOsm/kg.


DOI: 10.46718/JBGSR.2020.01.000024

7
It was noted that:

- 1.5% Glycine absorption showed markedly significant increase postoperatively (p=0.0001) as compared to preoperative normal level and returned to normal next morning without using any specific measures to reduce it (Figure below). Glycine did not reach significance on multiple regression analysis

- We thus disregarded the Toxic Hypothesis of Glycine (and ammonia toxicity) which was persistently, but hopelessly, chased by Robert Hahn.


### Funds Received

No funds were received from any source for any of my research studies or reports. I applied for a grant for the trial20 and the application was rejected. I never bothered to apply for any further grants or financial support for my research ever since. All my research and writing have been self-financed. The MD Thesis was successfully granted in November 1988 and the article was reported in 1990 at the BJU Int. The Editor of BJU at that time was the late professor GD Chisholm, may God bless his soul, who sent the article to a statistical reviewer who approved its statistics. He also sent me a written permission to reproduce material from the article later. It all happened before the Internet was brought to personal computers. The full Data on the investigation is still available on my 35-year old Apple Mackintosh that is still working but in complete isolation, stored under my bed. I cannot get the data out from Macintosh to place it on my current Laptop or the Internet as the Macintosh has no connection or CD or Flash memory that works on any other computer or Laptop.

The MD Thesis book and the article remain available. Many recently published articles self-referenced here and a book [45] on VOS are also available. Furthermore, every piece of data from this prospective study is now available in reported articles at various Open Access Journals some of it self-referenced here. The articles do not show on PubMed search engine because it has not listed Open Access journals yet. Only some of my articles appeared on Google Scholar search engine on first search, but later all of it with citations were shown. Hence, fellow researchers and physicians remain unaware of my contributions of my reported 53 articles of which 3 are in the press. Furthermore, the collected data on 100 studied TURP patients of whom 10 (10%) patients were symptomatic, has proved adequate for Stat View program on Apple Mackintosh computer to deliver significant results; VO

The data on 100 studied TURP patients of whom 10 (10%) patients were symptomatic, has proved adequate for Stat View program on Apple Mackintosh computer to deliver significant results; VO

The article later. It all happened before the Internet was brought to personal computers. The full Data on the investigation is still available on my 35-year old Apple Mackintosh that is still working but in complete isolation, stored under my bed. I cannot get the data out from Macintosh to place it on my current Laptop or the Internet as the Macintosh has no connection or CD or Flash memory that works on any other computer or Laptop.

The MD Thesis book and the article remain available. Many recently published articles self-referenced here and a book [45] on VOS are also available. Furthermore, every piece of data from this prospective study is now available in reported articles at various Open Access Journals some of it self-referenced here. The articles do not show on PubMed search engine because it has not listed Open Access journals yet. Only some of my articles appeared on Google Scholar search engine on first search, but later all of it with citations were shown. Hence, fellow researchers and physicians remain unaware of my contributions of my reported 53 articles of which 3 are in the press. Furthermore, the collected data on 100 studied TURP patients of whom 10 (10%) patients were symptomatic, has proved adequate for Stat View program on Apple Mackintosh computer to deliver significant results; VO

### References


DOI: 10.46718/JBGSR.2020.01.000024