New Vascular Procedure in Cardiac Surgery-Preliminary Ideas

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Cardiovascular and Pulmonary disease are the leading cause of death globally, several treatment facilities are readily available to treat many cardiopulmonary conditions however serious defects may happen often which therefore increases mortality rate significantly. In this paper new and radical cardiovascular surgical method is developed and briefly proposed for patients with severe pulmonary disturbances which makes patients impossible to inhale adequate amount of O2 thus reducing level of oxygen in blood. This surgery is however remains experimental and highly complex. Although the choice of candidate qualifying for this surgery must be selected carefully by investigating present and past medical history especially neurological and cardiological condition.

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Abbreviations: RA= right atrium, LV= left ventricle, LA= left atrium, IVC= inferior Vena cava, SVC= superior vena cava, RV= right ventricle, PV= pulmonary vein, PA=pulmonary artery, IVC= inferior vena cava, SVC= superior vena cava.

Pulmonary problems are serious and can be fatal because lungs is the only organ which enables gas exchange this means intaking oxygen and exhaling carbon dioxide in the beautiful process called breathing. Significant disease affecting alveoli are pneumonia, tuberculosis and pulmonary edema which can gradually cause hypoxemia. From other side heart is basically a muscle pump which continuously pump necessary amount of blood with required rate throughout the body to function properly. Cerebrovascular circulation is essential in cardiovascular aspect to deal with brain as a whole; any disturbances in cerebrovascular pathways can cause cerebrovascular accident or cerebrovascular insufficiency say ischemic stroke leading to cell death due to hypoxia. The reason of this note is quite different that is to rearrange heart and lung into a single mechanism, explanation of this surgical outlook as follows: The basic procedure is really complex and therefore must be executed with extreme precision in each step performed during operation. A very important suggestion must be suggested at the very beginning of this attempt that is the patient during general anesthesia must be connected with cardiopulmonary machine for survival and cardioplegia must be achieved. Suitable intravenous antibiotic therepy must be initiated during the procedure and cardiac and neurological monitoring is highly essential.

The configuration begins with altering the route of trachea means the trachea must be detached from lungs and carefully and precisely attached with heart's RA. The requirement of the technique to successfully reattach trachea with RA is superbly complex which at the same time must ensure functionality to intake and mix oxygen and remove carbon dioxide in and from blood means to reintroduce pathway of air movement. During the first step surgeons must be super extremely careful that they must not and never damage the heart's natural pacemaker the Sinoatrial Node or SA node, damage to this system can lead to cardiac conduction disorders and even death. Also damage in trachea will have serious consequence And in the second

step main PA and possibly with its left and right branches must be detached/deconnected from lungs and connected with heart's LA directly by abandoning PV or to connect PA and possibly its left and right branches with PV by disconnecting PV from lungs or both thereby providing new primary or main route to heart's left upper chamber.Therefore the blood flow map will eventually look something like this: Oxygen from air is inhaled and travel through nasal cavity and will pass through trachea to reach RA of the heart where the right upper cardiac chamber receives deoxygenated blood from systemic circulation via IVC and SVC at bottom and top respectively. Then as the body receives oxygen via trachea to RA the oxygen is then introduced or mixed with blood at RA and carbon dioxide is consequently exhaled. Then during the atrial systole blood from RA is pumped to RV via right atrioventricular valve the tricuspid valve. Then during ventricular systole as RV contracts the newly oxygenated blood will flow through pulmonary tricuspid valve to pulmonary artery and will drain in LA means LA is now fed by PA. Then as LA contracts in atrial systole the oxygenated blood is again pumped to LV via left atrioventricular valve the bicuspid mitral valve. The during ventricular systole LV contracts and sends oxygenated blood through tricuspid aortic valve to aorta (the largest artery indeed!) to be pumped to entire body via aortic distribution. The simplest argument is that the pulmonary circulation is minimized and the deoxygenated blood entering RA must be oxygenated there with high precision, simply heart's RA acts as a blood receiving and gas exchanging chamber means one can compare RA with combustion chamber of turbojet where air (oxygen) is mixed with fuel(kerosine) and then ignited. The proper functioning of LA at the same time must be ensured truly. The pulmonary and cardiac duties both are performed by heart thus evading lung function to initiate oxygen in blood.

Now the most complex part is to design a mechanism and rigorous technique to attach and control trachea with RA to ensure its absolute functionality, if natural or human trachea can be attached then it will be the best if not then synthetic or artificial trachea must be specially designed for this purpose. The most dramatic condition to understand is that no matter what trachea may be used one must come up with techniques so that oxygen must introduce in blood and carbon dioxide is successfully exhaled because it seems impossible to manage in the same way as it happens in lungs. If specially designed synthetic trachea is used then it may be connected to natural trachea and must alter its route to RA. Gas exchange section in artificial trachea (or Artificial Gas Exchange Section AGES) must be designed with unparallel precision only and only for this surgical procedure. One needs to figure out a way to modify gas exchange system if natural or human trachea is considered in surgery.

However the only vital concern related to the procedure above sketched is that with each atrial systole, blood will eventually flood the trachea (or artificial mechanism) and patient will suffer serious choking in his own blood. This problem is however serious and life-threatning, so AGES designers must introduce some Air Controllable (AC) valve which must synchronize during atrial diastole (ventricular systole) to introduce oxygen in blood in RA tank. The mini artificial "oxygen reservor"as a part of AGES may also be required to temporarily hold oxygen with AC valves closed during RA systole but as RA relaxes AC valves (works as a door) will open and allows oxygen to mix with blood, similarly with atrial systole AC valves will close to prevent blood backflow from RA to windpipe and thus evading choking of patient. The design of the entire AGES configuration discussed above is simple and

basic but it must need tremendous effort to built it in reality, all gadgets must be implantable.

Technically with this surgery lungs will become inactive means out of its function. Nervous or neurological intervention during the procedure must thoroughly be studied. This surgery is highly experimental and must improve its surgical technique gradually but post operative monitoring and care is extremely essential to identify any deviation. Artificial oxygen or ventilatory support may also be initiated post surgery at the same time thorough monitoring of respiratory system, rate and rhythm of breathing, oxygen level in blood are also essential during post operative management. Hypertension prevention must be supreme priority to prevent irreversible cardiac and vascular damage. Coronary artery disease is the enemy of this procedure being performed. Sudden cardiac arrest, arrhythmia, cardiac failure and other chance of occurrence of other cardiovascular disease must also be monitored.

This paper lays the groundwork for performing new cardiovascular surgery which is mentioned in this endeavour.