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Narrative Review

Tissue Bank at Bai Jerbai Wadia Hospital for Children – The beginning!

Jovita Martina Saldanha¹, Shankar Srinivasan¹, Suhas Vidyadhar Abhyankar¹, Mukund Thatte¹

¹Department of Plastic Surgery and Burns, Bai Jerbai Wadia Hospital for Children, Mumbai, Maharashtra, India.

***Corresponding author:**

Jovita Martina Saldanha,
Department of Plastic Surgery
and Burns, Bai Jerbai Wadia
Hospital for Children, Mumbai,
Maharashtra, India.

wadiaburnsandplastic@gmail.com

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ABSTRACT

The tissue bank at Bai Jerbai Wadia Hospital for Children was officially instated by the Department of Plastic Surgery and Burns on July 15, 2021, in compliance with the Transplantation of Human Organ and Tissue Act – 1994, amended in 2011. Our tissue bank follows the guidelines laid down by the Regional and State Organ and Tissue Transplant Organization, Mumbai (ROTTO SOTTO), for processes that involve screening, testing, processing, storage, and distribution of human tissues. This ensures that safe tissues of reliable quality for human transplantation are made available. The tissue bank has successfully cleared its inspection by the state government. This is just the beginning of our long journey. We started this journey with the preservation of amnion. We hope to process and preserve different allografts such as skin, bone, tendons, small joints, dura mater, and heart valves that will cater to the needs of our transplant services. We are also working on overcoming barriers by creating public awareness on placenta donation with the help of flyers. As we move forward, we will expand our boundaries for the greater benefit of patients and doctors.

Keywords: Tissue bank, Amnion, Allograft

HISTORY

Bai Jerbai Wadia Hospital for Children was much ahead of its time as it had first started its Skin Bank (SB) under the guidance of Dr. M.H. Keshwani with the help of the 3R society and Wadia Hospital Trust, in the year 1978. In those days, the department was well equipped with a deep freezer, lyophilizer, and liquid nitrogen tanks. The Skin Bank prepared freeze-dried skin as well as dura mater. Skin was successfully used as biological dressing and dura mater was used at King Edward Memorial Hospital by neurosurgeon Dr. Sunil Pandya. When the concept of preservation of allograft was rare, our institute was the first to sow the seeds of hope in this area. However, due to lack of awareness, there was scarcity of tissue as well as donors; hence, the project could not succeed.

The freeze-dried skin was once identified as a potato peel by a visitor. This gave rise to the idea of a potato peel bandage which was then used as a substitute for skin.

Today, many hospitals have understood the importance of a tissue bank. The government is slowly beginning to understand the need of the hour and more awareness programs are held

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to promote tissue donation. There are laws and guidelines laid down by the government that include tissues along with other organ donations. In India, the procurement of tissues for transplantation is governed by the Transplantation of Human Organs and Tissue Act (THOTA), 1994, amended in 2011.

The idea of a tissue bank was reconceptualized by our Department in 2014 as an amnion bank. Amnion as a biological dressing is well proven. Our close proximity and availability of placenta from our own sister organization – Nowrosjee Wadia Maternity Hospital – encouraged us to work on different cost-effective methods of preservation of amnion. A lot of research work was carried out to design the best, safe, and cost-effective methods of preservation techniques.

SETTING UP A TISSUE BANK

The tissue bank at Bai Jerbai Wadia Hospital for Children was officially constituted by the Department of Plastic Surgery and Burns on July 15, 2021, in compliance with the THOTA – 1994, amended in 2011.

Our tissue bank follows the guidelines laid by the Regional and State Organ and Tissue Transplant Organization, Mumbai (ROTTO SOTTO), for processes that involve screening, testing, processing, storage, and distribution of human tissues. This ensures that safe tissues of reliable quality for human transplantation are made available. The tissue bank successfully cleared its inspection by the State government and was registered by the Government of Maharashtra on August 12, 2022.

The staff of the tissue bank are appointed by the Head of the Institution based on educational qualification, experience, and training in accordance with the THOTA, ROTTO, and SOTTO guidelines.

The tissue bank provides and promotes a safe work environment. It is located in an appropriate area of 500 sq. ft and is designed and equipped for all tissue banking procedures [Figure 1]. It is also designed to prevent cross-contamination. A door with an air curtain separates the administration area from the processing area. It has a dedicated processing area of approximately 200 sq. ft and sterilization area of 200 sq. ft for sterilization of media, instruments, and equipment. An environmental monitoring is carried out once a month as part of the quality assurance procedure.

The tissue bank has all the equipment necessary for tissue preservation and storage. It follows all the guidelines for the maintenance of these equipment.

All safety precautions and procedures for maintaining a safe work environment are included in the standard operating procedure of the tissue bank.

The Hospital Infection Control policy dictates the following.



Figure 1: Tissue bank at Bai Jerbai Wadia Hospital for Children.

- Prevention of workers' injury including possible exposure to biohazardous material
- Procedure for proper storage, handling and utilization of hazardous materials, reagents, and supplies
- Procedure for handling spillage of biohazardous material
- Immunization policy of staff
- Disposal of human tissue and other hazardous materials

The hospital fire prevention and safety policy governs the prevention of fire and evacuation routes in case of fire or natural disaster.

The personnel engaging in the retrieval, processing, preservation, and packaging of the tissue wear an apron, sterile gloves, mask, and cap.

The tissue bank has started with the processing of amnion from placenta. It hopes to expand the project to various other tissues.

Strict inclusion and exclusion criteria are followed for donors and recipients. The anonymity between donor and unrelated recipient is strictly maintained.

Amnion is pre-treated with glycerol to take care of the window period of HIV. It is thereafter lyophilized (freeze dried), packed, and terminally sterilized by UV-C [Figure 2].

Since lyophilization reduces the moisture by 95% and also lowers the oxygen tension, it does not support enzyme activity and, thereby prevents deterioration of the graft and thus increasing its shelf life. Further, it enables the grafts to be available on demand and facilitates their convenient storage and transport at room temperature.^[1-3]

The ultraviolet radiation (UV) technology is characterized by high efficiency, easy operation, and convenient management and has been applied in water treatment, hospital air disinfection, food packaging disinfection, and antibacterial treatment of beverages, fruits, vegetables, meat products, and sea foods. After the irradiation by short-wave ultraviolet radiation, DNAs of microorganisms break and the replication and cell division of DNA is inhibited, thus leading to cell death. Therefore, UV sterilization technology has a certain commercial value and has been applied in surface disinfection of fresh agricultural products and liquid products as well as the disinfection of air and water.^[4,5] We implemented this technology to terminally sterilize the tissues. We validated the procedure in our laboratory with continuous sterility checks on the product and found it sterile for about 365 days from the date of packaging. Further studies are going on to check the shelf life of our product.

Each batch of tissue samples undergo a sterility check before it is made available to the recipient as a wound dressing material. Freeze-dried amnion is used for our burns patients and is available to others at a reasonable rate that just covers the tissue processing charges.

ADVANTAGE OF A TISSUE BANK

The cost benefit is the most attractive advantage of any indigenous allograft. In India, where the majority are unable to afford expensive imported grafts, these indigenous tissue banks can help to bring allografts within easy reach of all. Additional benefits accrue to patients as the use of allograft as opposed to autografts, reduce surgical time, and eliminate the need for prolonged anesthesia. Further, since the secondary surgery for obtaining an autograft is circumvented, the patient's recovery is faster, and the hospital stay is reduced.^[6]

Amnion is widely used in the treatment of skin wounds and chronic ulcers. It also provides good protection to underlying meshed autografts. Moreover, it is easily available. With the

use of amnion, frequent changes of dressings are avoided and analgesic use is reduced. All these result in considerable reduction of medical and hospital expenses.

With the availability of safe and clinically effective grafts, the approach to surgical treatment has undergone a radical change in the country. As the health benefits of using locally available allograft have become apparent, surgeons have begun using the grafts with more confidence and the demand for grafts now far exceeds the supply.^[6]

BARRIERS TO OVERCOME

The availability of safe, clinically useful, and cost-effective grafts has definitely resulted in changes in surgical treatment with a concomitant increase in demand for grafts and an interest in developing more tissue banks; however, the availability of donor tissue continues to be a major limitation.

There is insufficient public awareness, besides having religious and social taboos. This results in only a fraction of pledged organs or tissues being actually donated.

CONCLUSION

This is just the beginning of our long journey in setting up a tissue bank. We have started this journey with the preservation of amnion. We hope to process and preserve different allograft such as skin, bone, tendons, small joints, dura matter, and heart valves that will cater to the needs of surgeons. We are also working on overcoming barriers by creating public awareness on placenta donation through various methods. As we move forward, we will expand our boundaries for greater benefit.

Acknowledgment

We are grateful to our CEO, Dr. Minnie Bodhanwala for supporting our endeavor. She has been kind to provide us with the required infrastructure and equipment. Our sincere thanks to Hon. Consultant, Dr. A.M. Vartak for guiding us through the process.

Declaration of patient consent

Patient's consent not required as there are no patients in this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

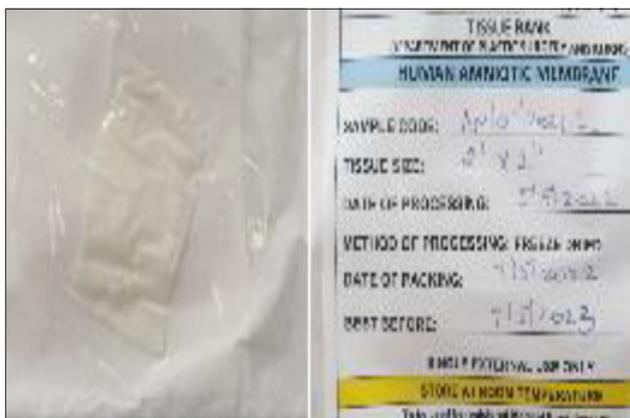


Figure 2: Freeze dried, packed, and UV sterilized amnion.

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