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Skin banking at a regional burns centre—The way forward

Sunil Manohar Keswani *, *Mukesh Gopinath Mishra, Shilpa Karnik, Shruti Dutta, Mamata Mishra, Sangita Panda, Reshmi Varghese, Tanvi Virkar, Vaishna Upendran*

National Burns Centre, Sector 13, Plot No. 1, Airoli, Navi Mumbai, India

ARTICLE INFO

Article history:
Accepted 16 November 2017
Available online xxx

Keywords:
RCBN Skin Bank
National Burns Centre
Skin harvesting
Glycerol preservation
Burn
Awareness campaign

ABSTRACT

In India approximately 1 million people get burnt every year and most of them are from the lower or middle income strata. Therefore it is obligatory to find out an economic way of treatment for the affected populace. Since use of human skin allograft is the gold standard for the treatment of burn wound, in-house skin banking for a burn unit hospital is prerequisite to make the treatment procedure affordable. Although, there was one skin bank at India till 2009, but it was difficult for a single bank to cover the entire country's need. Looking at the necessities, National Burns Centre (a tertiary burn care centre) along with Rotary International and Euro Skin Bank collaborated and developed an effective cadaveric skin banking model in Mumbai, Maharashtra in 2009. Initial two to three years were formation phase; by the year 2013 the entire system was organized and started running full fledged. The model has also been replicated in other states of India to accommodate the large burn population of the country. This paper therefore, gives a step by step account of how the bank evolved and its present status.

1. Introduction

Skin allograft has been found to be an extremely useful and life saving temporary skin cover in the management of extensive burn patients. Since the first clinical use of skin allograft by Girdner in 1881, skin banking methods have also evolved over the years [1]. The evolution is mainly seen in different preservation techniques. Currently there are about three different preservation techniques used in skin banking, namely glycerol preservation, deep freezing and cryopreservation [2–5]. Hence, the skin banks use one of these methods as per the suitability of the region. Although the developing world shares the maximum burden of extensive burn patients, there are very few skin banks in developing countries like India. A country like India which records about 1 million burn cases annually, had only one skin bank until the year 2009 at Lokmanya Tilak Municipal (LTM) medical college and hospital, in Mumbai, Maharashtra [6]. Looking at the needs of the entire country's burn population, National Burns Centre (a tertiary burn care centre) along with Rotary International and Euro Skin Bank joined hands to plan and develop a sustainable skin banking model in Mumbai, Maharashtra, India which could be easily replicated in other parts of the country and abroad. The model consisted of mainly four aspects: 1. the finance of setting-up and running a skin bank was supported by Rotary, 2. the technical assistance was provided by Euro Skin Bank, 3. the procurement, processing, preservation and distribution were

* *Corresponding author.*
E-mail addresses: smkeswani@gmail.com, skinbanknbc@gmail.com (S.M. Keswani).
https://doi.org/10.1016/j.burns.2017.11.010
0305-4179/

looked after by National Burns Centre and 4. the most important part, the continuous large scale awareness campaign was supported and executed by a group of Non-governmental Organizations (NGOs) led by Rotary along with National Burns Centre. The model has been proved successful in Mumbai and has been replicated across Maharashtra and other states of India (Karnataka, Tamil Nadu).

National Burns Centre at Airoli was established in the year 2001 with a fivefold goal of Prevention, Treatment, Training, Rehabilitation and Research in Burns. Being the only burn speciality hospital in India, there was a need for temporary skin cover to treat extensive burns. Low cost cadaveric skin was probably the only option. Importing cadaveric skin or skin substitutes was not a feasible option because of its high cost. Hence the idea of establishing an in-house skin bank was proposed. However there were many challenges in establishing the skin bank and further running it. This paper describes the step by step approach in the development and the current status of the skin banking model in India at NBC.

2. Methodology

2.1. *Development of RCBN Skin Bank at NBC*

2.1.1. *Step-1: association with NGOs like Rotary clubs*

The success of a functional skin bank largely depends on creating mass awareness about skin donation consistently and establishment of a state-of-the-art skin bank for producing high quality allograft at a very affordable cost. This required significant manpower and financial support. So it had to be a non-profit organization. Hence, it required the association of philanthropic NGOs like Rotary. NBC collaborated with Rotary Club of Bombay North to develop a model of skin banking for a country like India. A skin bank committee was set up comprising members of Rotary Club of Bombay North and NBC to plan and execute the working of the skin bank.

2.1.2. *Step-2: choosing the preservation method and a visit to the Euro Skin Bank*

Skin banks around the world mainly follow two protocols for skin preservation: cryopreservation and glycerol preservation [7,8]. Literature indicates that both these preservation techniques show comparable clinical results [9]. But, a study of the current literature proved that skin preserved in glycerol was easy to procure, process and distribute at a low cost [10]. Based on the economic status of India, glycerol preservation method proved to be the most suitable.

The Euro Skin Bank being the pioneer of glycerol preservation technique, the members of the RCBN Skin Bank Committee visited the Euro Skin Bank to explore for a possible technical collaboration.

2.1.3. *Step-3: preparation and execution of a continuous skin donation awareness programme for the public*

Because of a lack of awareness among the general public about skin donation, it was decided to initiate a continuous public awareness campaign throughout Mumbai through different media. Initially Rotary took charge of the awareness programmes, and soon other NGOs also followed them. The details of the programme structure are given in the following section.

2.1.4. *Step-4: pilot visit of Euro Skin Bank director to NBC in year 2008 and setting up a state-of-the-art skin bank as per Euro Skin Bank guidelines*

A pilot visit of the Director of Euro Skin Bank was organized in the year 2008 to lay the foundation stone of the RCBN Skin Bank project. The visit streamlined the process of skin bank establishment. Euro Skin Bank officially agreed to share all the necessary technical details for skin banking with NBC and also to train two of the staff members from NBC in setting up a skin bank as per Euro Skin Bank guidelines. It proposed to make the skin bank at NBC a nodal centre for all the other regional skin banks which would be established in association with NBC in India.

Skin bank infrastructure along with the necessary equipments were put in place by 2009 using the funds generated by Rotary Club of Bombay North mostly through donations and personal contribution of the club members.

2.1.5. *Step-5: training of personnel to run the bank*

The Medical director of NBC took up the responsibility of looking after the overall functioning of the skin bank. The skin bank team includes skin donation awareness team, skin harvesting and skin processing team. From the existing staffs of NBC, members were chosen and trained for the same. Thereafter, the skin bank was inaugurated in November 2009.

2.2. *Skin banking protocol at NBC*

Euro Skin Bank protocol is followed at NBC [8] for skin harvesting, processing, preservation and distribution. Upon receiving a skin donation call from NGOs or relatives, death certificate is checked for inclusion or exclusion criteria of the cadaveric skin (exclusion factors: known cases of cancer, active jaundice, sexually transmitted diseases, psoriasis, skin hypersensitivity etc.). After confirming the call, skin harvesting team is organized. The team consists of four members; one harvesting doctor, two nurses and one driver. The team reaches the home or hospital and explains to the family about the novelty and purpose of cadaveric skin collection and takes their informed written consent. After body examination, skin is disinfected with combination of povidone-iodine, chlorhexidine gluconate and isopropyl alcohol. Skin is harvested from back, leg and thigh regions under strict aseptic condition. The doctor in the team harvests skin using battery operated dermatome and collects the strips of skin into 50% glycerol containing antibiotics (Penicillin: 1,000,000 units and Streptomycin: 1 gram); blood sample is collected at the same time for testing of HIV, HBsAg, HCV etc. (phase 1). It is then carried to the skin bank by the same team and kept at 4–8 °C. Within 48 h blood reports are obtained from the pathology department of NBC. After getting negative blood reports, within 48 h, the skin strips are transferred to 85% glycerol containing antibiotics and kept at 33 °C in shaking condition for 3 h. for glycerol lubrication (phase 2). Skin strips are then stored at 4–8 °C for further incubation. After completion of incubation period skin is meshed and the quantity is measured (phase 3) and stored at

Please cite this article in press as: S.M. Keswani, et al., Skin banking at a regional burns centre—The way forward, Burns (2018), https://doi.org/10.1016/j.burns.2017.11.010