

Quality control measures in reducing rejection rate of bones from living donors

Ramalingam S, Yusof N, Yasin NF, Albaker MZA, and Mansor A
 UMMC Bone Bank, NOCERAL, Department of Orthopaedic Surgery, Faculty of Medicine,
 University of Malaya, Lembah Pantai, 50603 Kuala Lumpur, Malaysia.

INTRODUCTION:

Bones procured from living donors via hip (femoral head, FH) and knee (knee slices, KS) replacement surgeries can be used in various bone transplantations^{1,2}. Quality control (QC) is essential in bone banking especially in donor recruitment to ensure bones are meticulously screened to provide utmost safety for recipients. A retrospective analysis on collected and rejected bones over 10 years was reviewed.

METHOD:

The potential donors were briefed on bone donation prior to surgeries before he/she consented for sample withdrawals (blood and swab). ID was assigned for each bone before triple packed. Swab and blood samples were sent to microbiology laboratory for bacteriological and serological tests respectively. The procured bones were stored in quarantine -80°C freezer until the test results were obtained. The potential donors were screened using bank’s donor exclusion criteria, complying to American Association of Tissue Banks (AATB) and Asia Pacific Association of Surgical Tissue Bank (APASTB) standards to be a donor. Bones with positive test results were rejected and discarded immediately. The reasons for rejection were documented and analyzed.

RESULTS:

The main causes of rejection varied over two-time intervals (2013 - 2016 vs 2017 - 2022) (Table 1)

Cause of rejection	2013 – 2016 (1 st)		2017 – 2022 (2 nd)	
	n	%	n	%
Refuse to donate	30	14.63	0	-
No consent	25	12.19	0	-
Positive bacteriology	22	10.73	27	20.77
Positive serology	0	-	26	20.00
Medical history	0	-	43	33.07
Improper sample handling	20	9.75	0	-

Table 1: Discarded bones according to the cause of rejection, during each interval

Refusal to donate was the main cause in the first time interval and patient’s medical history in second. Patients with cancer/tumor, rheumatoid arthritis and Parkinson’s disease were among most rejected in medical history screening. A total of 958 bones were collected, (853-FH and 105-KS) as in Table 2. However, 315(36.9%) FH and 20(19.0%) KS were rejected, adhering to strict donor screening.

Year	Collected bones			Discarded bones	
	Type		Total	n	%
	FH	KS	n		
2013	106	0	106	67	36.8
2014	82	4	86	44	48.8
2015	105	9	114	57	50.0
2016	77	6	83	37	44.6
2017	79	0	79	23	29.1
2018	82	15	97	23	23.7
2019	77	8	85	22	25.8
2021	83	25	108	26	24.0
2021	84	37	101	15	14.8
2022	97	1	98	21	21.4

Table 2: Number of collected and discarded bones (2013-2022)

DISCUSSION

The rejection rate over the 10 years showed a decreasing trend. Rejection rates were 36.8-50.0% (2013-2016) and tremendously improved to 14.0 - 29.0% (2016-2022). It can be deduced that all QCs pertaining to bone collection and screening were optimized. The potential donors were screened strictly after 2016. Thorough screening on bone quality during intra op by surgeons helped to reduce the rate. Besides, Donor Kit approach that was implemented circa 2017 helped to reduce misappropriate sample handling in the operating theatres.

CONCLUSION

Stringent QC in donor recruitment must be implemented in tissue banks, with aim not only to ameliorate bone collection but to optimize it to reduce rejection. This is to ensure the bank supplies high quality bones for recipients.

REFERENCES:

1. Mohd S et al. Cell Tissue Bank, 16(4):523-530.
2. Fu S-H et al. PLoS ONE 12(10): e0184809.