Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages. 10792 - 10796
Received 25 April 2021; Accepted 08 May 2021.

Comparison of Different Visualization Systems & Armamentariums for Micro vascular Cases in Craniofacial Surgery- An Original Research

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ABSTRACT

Introduction: Microvascular surgery has become an important method of reconstruction in craniofacial surgeries. Hence in the present study we aim to analyze the loupes and the microscope for magnification for free tissue transfers in head and neck reconstruction.

Material and method: We conducted a retrospective study of 151 consecutive microvascular free tissue transfers compares the operating microscope with loupe magnification at tertiary care medical center.Medical records were reviewed for demographic data, preoperative radiation status, type of defect and flap, length of procedure, complications, and length of stay.

Results: Two teams shared the reconstructions, with all microvascular anastomoses. The operating microscope was used for magnification in 84 cases, while the other used loupes in 67 cases. Complication rates were statistically similar for the 2 techniques, the length of procedure tended to be shorter in the loupe group, and the length of stay was statistically similar in both groups.

Conclusions: Loupes can be used with comfort and easy access to and uncomplicated visualization of the operating field. The loupes may lower operating time and help avoid complicated equipment. The loupe magnification should be considered in the armamentarium of head and neck reconstruction without the fear of increased morbidity

Keywords: Visualization Systems, Microvascular,Operating Microscope, Loupe Magnification

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INTRODUCTION

Microvascular surgery has become an important method of reconstruction in craniofacial surgeries. The operating micro- scope is commonly used to ensure the patency of microvascular anastomoses, mainly when manipulating vessels <3 mm.[1,2] Even if Magnification is necessary when creating anastomoses, the operating microscope can be clumsy, often necessitating the patient, surgeon, or assistant surgeon to be in uncomfortable positions while doing the intricate repairs.Operating loupes have been used in microvasculature reconstructions. The loupes deliver exceptional magnification (×2.5 to ×6.5) and easy to use. However they are assumed to be inferior to microvascular anastomoses. Yet, reports in other publications have indicated the effective use of loupe magnification when repairing peripheral nerves[3] or reversing sterilization.[4] Loupe magnification was successfully used for microvascular anastomoses by some authors.[5-7]

Hence in the present study we compared the loupe and the microscope visualization systems & armamentarium for microvascular cases in craniofacial.

MATERIAL AND METHODS

We conducted a retrospective review, at the department of oral and maxillofacial surgery. The records were verified for the cases done between 2014-2021. Medical records were later evaluated, and filed into a computer spreadsheet program for the patient's age and sex, tumor site, history of previous radiation therapy, type of free flap/ microvascularsurgey complications, length of procedure, length of stay (LOS), and type of magnification used for the creation of microanastomoses.The ablative team would normally complete their work before the reconstructive team began, allowing the microvascular surgeons to know exactly the extent of the defect.All reconstructive and microanastomotic procedures were performed with the same lead surgeon however, the cosurgeon determined whether the microscope (R.R.) or loupes (S.A.) were used for the microanastomoses.A total of 151 cases were noted in which 84 were microscopes and loupes were used in 67. A 9-0 nylon microsuture was used with the microscopic anastomoses, and an 8-0 nylon microsuture was used with the loupes. The ring-type microanastomotic system coupling device was used to perform anastomoses on the most veins. Arterial anastomoses were either end- to-side to the external carotid artery or end-to-end to its branches. The veins underwent anastomoses either end-to-side to the internal jugular vein or end-to-end to the other previously mentioned recipient vessels. Large suction drains were placed in the neck, away from the anastomoses. Vascular patency was assessed clinically by various parameters. Statistical analysis was done using the appropriate tools keeping the $p<0.05$ as significant.

RESULTS

We reviewed a total of 151 FTTs in the head and neck, 67 of which were performed with loupe magnification for the creation of microanastomoses. Mean age was 57± 5 years. sex distribution is shown in **Table 1.** No statistical differences between the loupe and microscope groups when comparing age or sex (P>.10).

Table 1.Distribution of the subjects.

Sex	**Microscope Group**	**Loupe Group**	**Total**
Male	43	43	**86**
Female	33	24	**57**
Total	**76**	**67**	**143**

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Majority of the reconstruction site were mandible followed by tongue maxilla, temporal bone and the parotid (n= 2). Cancer was identified as the prime reason for the need of te reconstruction. Most patients had 1 flap. The reconstructions included the following donor sites as seen (**Table 2**).

Table 2. Free Flap Donor Sites and Length of Operative Time and Hospital Stay

Donor Site	**Group, No.**			**Operative Time, min/Group**		**Hospital Stay, d/Group**	
	Microscope	**Loupe**	**Total**	**Microscope**	**Loupe**	**Microscope**	**Loupe**
Radial forearm	36	39	**75**	605	606	16.1	16.7
Fibula	21	17	**38**	649	568	21.3	19.4
Rectus abdominis	13	1	**14**	634	430	16.5	7
Lateral arms	10	2	**12**	666	805	19.1	21
Latissimusdorsi	1	6	**7**	630	578	31	14.7
Scapula	1	2	**3**	690	689	19	70
Jejunum	2	0	**2**	692	. . .	30.5	. . .
Total	**84**	**67**	**151**	652*	613*	21.9*	24.8*

*Average.

The mean complete procedure time (ablation and reconstruction) for the microscope group was 652 minutes. The comparable average time for the loupes group was 613 minutes. There was no statistically significance between two groups. The average operative times were also calculated for each donor site (Table 2). There were no statistical differences in the time of procedure when comparing the two groups (P>.05)The average hospitalization time for the microscope group was 21.9 days vs 24.8 days for the loupe group (P>.10). As with the operative times, the length of hospitalization was calculated for each donor site (Table 2). Complications were divided into the following categories: venous thrombosis, arterial thrombosis, hematoma, fistula, wound dehiscence, and partial necrosis.Failure is seen: 2 from the loupe group and 2 from the microscope group.The reexploration rate in the loupe group was 7% (n= 5), and in the microscope group, 5% (n= 4). The overall flap survival rate was 97.0% for the loupe group and 97.6% for the microscope group. The difference between the 2 groups was not statistically significant (P>.10).

DISCUSSION

Various microvascular surgeries are performed in the head and neck region. Free tissue transfers for head and neck reconstructions is one of the most popular techniques. This technique is more favored as advances in techniques and instrumentation and to more reliable donor sites.[8] Discovering new ways to speed up and streamline the actual surgery and the postoperative care of patients undergoing FTT is critical not only as of the severe cost pressures to the practice of medicine but also due to the less anesthesia time can hasten a patient's recovery process.In the present study it was not established if the loupe magnification was a more time-conserving method of creating anastomoses than the surgical microscope. In various previous researches

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loupe magnification can decrease operative time when creating tubal anastomoses by as much as 14% was presented.[9]The rates of complications are statistically the same in both groups. There were no demonstrable increases of anastomotic failures in any of the groups. A 97.6% microscope and a 97.0% loupe success rate are highly compatible with previously published success rates for either loupe or microscopic magnification.[6,10-16]In addition, even though our LOS data seem to be on the high end of published data for FTT, there were no differences between the microscope and the loupe groups. Miller et al[17] showed that the LOS was higher in FTT patients undergoing aerodigestive tract reconstructions (21 days) compared with those undergoing non–aerodigestive tract reconstructions (16 days) of the head and neck. Our mean results of 22 and 25 days for the microscope and the loupe groups, respectively, are similar to those of Miller and coauthors, especially with 2 spurious but high LOSs (70 days in the loupe group and 30 days in the microscope group).Microscopes also require that the assistant and the surgeon be looking from similar angles. Loupes allow each operator to rapidly and simply be looking at the surgical fields from 2 different vantage points.Others have confronted loupes because of operator discomfort, limitations in the visual field, and limited magnifying power. Using loupes for an extended period may predispose the operator to neck fatigue and discomfort; however, by not being restricted to looking through a microscope, a shifting of the head and viewing the surgical field from a different vantage point decrease fatigue. Also, loupes are being made with lighter materials to address this complaint. Focal lengths are being improved, and the width and depth of visual fields have been improved with the wide-angle view loupes. The power of magnification was ×3.5 magnification. Although magnification of up to ×6.5 is readily available, loupes of that power are usually not used.The loupe magnification is economic, easy to use, portable, and, efficient for the surgeries. Two pairs of loupes cost lower than a surgical microscope. Loupes are low on maintenance, whereas a surgical microscope are not— especially in busy operating rooms. Nurses can easily be trained for loupes, whereas extensive training is required of any health care professional in the use and maintenance of the microscope. In some communities, the high cost of a surgical microscope makes loupes an affordable and far less expensive alternative in the capital budget of the operating room. In many countries, the cost of the operating microscope and its maintenance are prohibitive; the operating loupes allow for the use of free flaps in virtually any operating room setting, permanent and temporary. The microscope would be useful, when the vessel's diameter is <1-mm lumen.

CONCLUSION

In conclusion, we compared loupe with microscope magnification for the creation of microanastomoses. Loupes offer the surgeon ease and access to and unfussy visualization of the operating field. Additionally, loupes may lower operating time and evade complicated equipment. We conclude that loupe magnification should be considered in the armamentarium of head and neck reconstruction without the fear of increased morbidity.

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