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Nursing Care for Patient Who Underwent Face Transplant During Intensive Care: A Case Report

Yüz Nakli Yapılan Hastanın Yoğun Bakım Sürecindeki Hemşirelik Bakımı: Olgu Sunumu

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ABSTRACT There is restricted information on nursing care and follow-up for patients undergoing face transplantation. After face transplantation, the nursing interventions to follow-up and allayment the patient and the discussion of the responsibilities of the nurse in drug management will contribute significantly to the healing process of the patient. This case involves nursing care in the intensive care period after surgery of the patient with face transplantation. To 26-year-old male patient, a full face transplant including the ears and the scalp was performed. In the post-operative intensive care period; the patient was closely monitored for hemodynamic balance, pain management, with the aim of preserving for infection control and tissue viability. The patient was followed-up for 8 days in the intensive care unit and did not develop any life-threatening problems. The importance of nursing in the care of patients undergoing face transplants is undeniable. Especially in the intensive care process; feeling the presence of the nurse for pain and agitation control, drug management sudden changing hemodynamic status, maintaining patient and environmental safety for infection control is the responsibility of the nurse and are important initiatives that contribute to the patient's recovery. However, the literature on proper nursing care for such an important responsibility is very restricted. This case report is thought to be enlightening for nurses in the care of patients undergoing face transplantation.

Keywords: Face transplantation, nursing care, intensive care

ÖZ Literatürde yüz nakli yapılan hastanın hemşirelik bakımı ve izlemine yönelik bilgi oldukça kısıtlıdır. Yüz nakli sonrası hastanın takibi ve rahatlamasına yönelik hemşirelik girişimleri ve ilaç yönetimindeki hemşirenin sorumluluklarının tartışılması hastanın iyileşme sürecine önemli katkılar sağlayacaktır. Bu olgu yüz nakli olan hastanın cerrahi sonrası yoğun bakım sürecindeki hemşirelik bakımını kapsar. Yirmi altı yaşındaki erkek hastaya kulak ve saçlı deriyi de kapsayan total yüz nakli yapıldı. Hasta operasyon sonrası yoğun bakım sürecinde; hemodinamik denge, ağrı yönetimi, enfeksiyon kontrolü ve doku canlılığının korunması amacı ile yakından izlendi. Yoğun bakımda 8 gün takip edilen hastada hayatı tehdit eden herhangi bir problem gelişmedi. Yüz nakli yapılan hastaların bakımında hemşireliğin önemi inkar edilemez. Özellikle yoğun bakım sürecinde; ağrı ve ajitasyon kontrolü için hemşirenin varlığını hissettirmesi, ani değişen hemodinamik duruma göre ilaç yönetimi, enfeksiyon kontrolüne yönelik hasta ve çevre güvenliğinin sürdürülmesi hemşirenin sorumluluğunda olan ve hastanın iyileşmesine önemli katkı sağlayan girişimlerdir. Ancak böylesine önemli bir sorumluluk için uygun hemşirelik bakımı konusunda literatür oldukça kısıtlıdır. Bu olgu raporunun yüz nakli yapılan hasta bakımında hemşireler için aydınlatıcı olacağı düşünülmektedir.

Anahtar Kelimeler: Yüz nakli, hemşirelik bakımı, yoğun bakım

Introduction

Face transplantation, known as a composite tissue transplant, is a treatment that is considered as the gold standard for severe facial injuries (1,2). Face transplants ensure that the recipient's face is restored both functionally and cosmetically via a single major surgery in circumstances where conventional reconstruction could yield limited success (1,3,4).

Before considerable success was achieved by face transplants and their use was widespread, flaps and grafts were commonly used for the treatment of facial injuries (5). However, these treatment methods could not ensure an aesthetic result and usually caused tight scars that led to functional loss and problems with facial expression (5). Through face transplantation; however, it is more likely to have a normal looking face that allows the movement of the deep structures (5). The first face transplant was performed in France in 2005 (6) and, to present, 23 face transplants have been performed throughout the world (7). Although the results of these transplants were mostly promising, a patient who underwent face transplant in China died one year after the surgery (7,8). In Turkey, the first facial transplant surgery was performed on January 21, 2012, at Akdeniz University Hospital (9). Subsequently, two transplants were performed in the medical school hospitals of Hacettepe and Gazi Universities and a total of 5 transplants were carried out in Akdeniz University Hospital (9). Between May 14th and 15th 2012, a full face transplant (including the ears and the scalp) was performed at Akdeniz University Hospital (9).

Face transplantation surgeries require intense concentration and should only be performed by a team of experts with well-defined duties (3,10). Nursing care is important from the moment a patient is initially evaluated, throughout the patient's hospitalization from admission to discharge, and at all outpatient follow-ups (11). During the surgical process, postoperative follow-up and nursing care are crucial for the success of the treatment (1,12). In the literature, there is limited information on nursing care and follow-up for patients undergoing face transplantation (11). Based on the present case report, this article addresses nursing care for face transplant patients throughout the clinical process and during intensive care after surgery.

Case Report

History of Patient

The male patient was 26 years old. He suffered facial injury in 2007 when his firearm went off while he was

cleaning it. The patient whose mid-face (nose, palate, upper and lower jaw and the anterior tongue) was missing, underwent about 30 surgeries-though serious defects, both structural and functional, remained on his face. He suffered from functional problems regarding respiration, speaking, eating, and drinking. About one year ago, the patient was prepared for the face transplant surgery through psychological and physical intermittent meetings and examinations.

The operation lasted about 14 hours. Throughout the operation, 13 units of red blood cell and 2 units of fresh frozen plasma were used. When the patient was admitted to the intensive care unit, he had an arterial and a central catheter in place and had undergone tracheotomy.

Preparing Patient Room for Postoperative Intensive Care

Nursing interventions specific to the face transplant surgery were used for the treatment of our patient and listed in the case report. Briefly, the first step postoperative nursing care processing and the patient's room were prepared in intensive care unit before the operation. All equipment and devices were made available. Spare mechanical ventilators, infusion pumps, perfusors, and vital sign monitors were obtained in order to ensure uninterrupted and continuous mechanical ventilation, vital sign monitoring and drug infusion, and to eliminate the risk of malfunction.

Hemodynamic Monitoring

In order to achieve hemodynamic stabilization, the patient was closely monitored and the mean arterial pressure, hematocrit, and urinary output were kept at 65 mmHg, greater than 27.0%, and 1 to 1.5 mL/kg/h, respectively. Since arterial route occlusion or other problems can occur during the transfer of the patient to the intensive care unit, the arterial line system was calibrated and blood pressure was confirmed via non-invasive measurements. The monitored parameters were carefully observed for any sudden changes, and the alarm limits were set to critical levels.

When the patient was admitted to the intensive care unit, his vital findings were as follows: mean arterial pressure: 65 mmHg, systolic arterial pressure: 114 mmHg, diastolic arterial pressure: 63 mmHg, heart rate 123/min, oxygen saturation: 100%, and urinary output: 0.3 mL/kg/h. He was ventilated with a Maquet® (firm, production land) ventilator using the following settings: volume assist control with fraction of inspired oxygen: 0.4, 5 cm H₂O positive end-expiratory pressure, and 500 mL tidal volume. Since the patient had hypotension during surgery, the inotrope drug (0.8 mg/kg/h Dopamine IV infusion) was started in the

operating theatre and was continued in the intensive care unit. Esmolol hydrochloride 0.05 mg/kg/min was started to the patient for tachycardia and drug dose was increased/decreased according to heart rate. The patient experienced arterial hypertension (mean arterial pressure: 101 mmHg, systolic arterial pressure: 179 mmHg and diastolic arterial pressure: 86 mmHg) on the second day of admission to the intensive care unit. The patient experienced hypertension on the postoperative second day; therefore, infusion nitroglycerin was initiated according to the blood pressure. During the infusion process, the intravenous route was checked frequently to ensure patency. Consultations aimed to determine the cause of hypertension and diagnostic interventions like renal ultrasonography were carried out. The examinations for hypertension did not reveal any pathology. Hypertension was normalized on the postoperative 4th day.

Graft Perfusion Management

Graft perfusion monitoring was performed for color, texture, capillary refill, and temperature of microvascular flap. Monitoring was performed every 15-30 minutes and all observation notes were documented. In addition, we made the other nursing interventions, including: 1) a head up at 15 °C-30 °C position was used for enhanced venous drainage; 2) postoperative head up position and negative fluid balance were used to reduce face edema; and 3) the patient's room was warmed up (between 22 and 24 °C) and an additional warming tool (underbody warming blanket) was placed on the patient's bed to prevent tissue ischemia. When the patient was admitted to the intensive care unit, his body temperature was below 35 °C. In order to increase capillary dilatation and microcirculation through heat, a body temperature between 36.5 °C and 37 °C was targeted. Therefore, the patient was warmed with a heating blanket. Two hours after admission to the intensive care unit, the patient's body temperature was 36.5 °C. Thus, the warming procedure was gradually ended. In addition to the heated blanket, a light source was focused on the graft incision site and enoxaparin sodium (Clexane®) 4000 anti-Xa/0.4 mL was started for heparinization to assure microcirculation.

In order to prevent tissue rejection, intraoperative IV steroid (1000 mg) was administered and supplemental anti-thymocyte globulin IV was used following the first hours of intensive care unit admission (on the postoperative 0th day). Opportunistic infection prophylaxis (antibacterial, antifungal, and antiviral therapy) was administered preoperatively and continued postoperatively. The patient was treated in

intensive care unit for 8 days. During the intensive care unit process, no skin rejection occurred, tissue was successfully maintained.

In order to speed up tissue recovery, both parenteral and nasogastric tube feeding was started simultaneously with the onset of intestinal motility. The patient received 25-30 kcal and 1.5-2 grams of protein per one kilogram of his body weight per day. Since the patient had nausea and vomiting on the postoperative sixth day, enteral feeding was ended and an antiemetic was started. The feeding problems resolved on the postoperative tenth day and enteral feeding was continued. No further problems with feeding occurred.

Caring for Infection Control

To prevent ventilator-associated pneumonia, the head of the bed was elevated between 30 °C and 45 °C, secretion removal via tracheal aspiration was performed, and an intubation cuff pressure of 20-22 cm H₂O was maintained (13,14). Since the patient had nose, mouth, tooth, and jaw transplants (along with the face transplant), his oral care was performed through the aspiration of oral secretion with a 10 Fr suction catheter and recommended lowest suction pressure (80 mmHg) (15,16). Aspiration was carried out whenever secretions accumulated excessively in the mouth. In order to protect the oral incision area, the aspiration was performed without pushing the suction catheter too deep into the oral cavity. Oral care using a solution was started after the patient was discharged from the intensive care unit. In addition to the oral care, traceostomy care was performed twice a day to prevent ventilator-associated pneumonia. During the intensive care unit process, infection signs were not observed.

Caring for Pain and Agitation

The patient experienced agitation during the waking process after 72 hours admittance to the intensive care unit. Our patient had undergone full face transplant involving the upper and lower jaws, the nose, and the base of the tongue and eye lids. Therefore, it was assumed that the agitation may be a result of the high number of incisions and limitations, including the inability to talk, use facial expressions, and move. In order to soothe the patient, he was informed of his whereabouts, the management of his anxiety, and continual healthcare provision. He was asked to perform a "hand squeeze" to answer our questions about his consent for certain procedures, because of, he could not speak and move eye lids. All procedures were carried out

only after it was clear that he was content with them. It was observed that the patient was more relaxed and comfortable this way. Dexmedetomidin (Precedex®) IV infusion was administered to control the patient's agitation and midazolam (Dormicum®) 1.5 mg IV bolus was supplemented when needed. The patient's agitation that gradually decreased was totally managed on the postoperative fifth day.

The patient was transferred to the general ward from the intensive care unit on the postoperative tenth day, and no problems with hemodynamic values or the face flap were observed.

Discussion

During the surgical process, postoperative follow-up and nursing care are crucial for the success of the treatment (1,12). In New York University's Langone Medical Center, the nursing department has developed and implemented a comprehensive educational program for staff before performing its first face transplant procedure. The main educational focus has been on airway management, Hemodynamic management, immunosuppression regimen, free flap management, identification of acute rejection, delirium and psychosocial needs, and postoperative communication needs (11). The care goals in the intensive care period are the maintenance of tissue perfusion, cardiac and hemodynamic stabilization, pain, and agitation management (10,17).

Hemodynamic Stabilization

Hypotension or hypertension and hypovolemia or hypervolemia could be detrimental to flap viability and affect patients' outcomes (18). Nurses are in charge of the multiple drug and fluid infusions used for the management of hemodynamic changes. In particular, the brief increases and decreases in the administration of vasoactive agents may cause hyper- and hypo-tension. The patency and safety of the intravenous path should be ensured in order to administer drugs and fluids for the prevention of rapid hemodynamic changes (19,20). Similar to other organ transplants, face transplants may lead to prolonged anesthesia, hypothermia, blood loss, and postoperative hemodynamic alterations due to immobility. Therefore, an experienced nurse must care for the patient during each shift (17-22). Literature studies commonly report hypovolemia due to massive intraoperative bleeding, tachycardia, and hypertension after face transplantation surgeries (10,23-27).

Vital sign monitoring and uninterrupted drug infusion have vital importance during the postoperative intensive care period (21). Therefore, we think that postoperative nursing care for hemodynamic changes was managed successfully for our case.

Graft Perfusion Management

Flap assessment is vital in monitoring the success of the transplanted face. Nurses caring for postoperative patient with face transplantation need to have appropriate knowledge and skills in monitoring flap viability, factors that affect flap survival detrimentally, and early recognition of complications. It is well documented that there are a number of microvascular flap observations that need to be carried out as part of the flap assessment. They include the color, texture, capillary refill, and temperature of microvascular flap (18). Color is often the best indicator of the adequacy of blood flow flap. If the arterial supply is occluded, the flap may become pale or mottled blue. If the flap is purple/blue in color, the venous occlusion may be occurring and nurses caring for postoperative patients should be mindful of the complications (28,29). Capillary refill was done by applying gentle finger pressure over the flap. The flap should blanch with a return of color within 2-3 seconds after the pressure is released. If the capillary refill is longer than two-three seconds, it may be indicative of arterial insufficiency. If capillary refill is less than 1 second or the tissue does not blanch at all, this may be indicative of venous congestion/occlusion (28,29). The flap should be warm to finger touch, and a cool flap may indicate a problem with the arterial supply (28).

Flap tissues are susceptible to interstitial edema having had their lymphatic drainage disrupted. Drain patency should be checked to ensure uninterrupted venous drainage. Edema reduces flow to the flap and may be a result of extreme hemodilution, trauma from handling, or a prolonged ischemia time (10). Crucial intervention against tissue perfusion is hypothermia management (30,31). Hypothermia increases blood viscosity and causes vasoconstriction, which eventually results in decreased tissue blood flow (17,32).

Caring for Pain and Agitation

In the process of intensive care after face transplant operation, there is no nerve innervation in transplanted facial tissue. Therefore, patients cannot move eyes, lips, or other facial movements and feel weight of flap on their face. A feeling of heaviness in the face and speech disability causes

agitation in patients. There are many studies in literature that report problems in intensive care patients such as pain (27), intubation-related discomfort, difficulty swallowing, intense feeling of thirst, inability to talk (33,34) and anxiety all of which result in agitation (35,36). Along with these problems, face transplant patients suffer from face transplant "trauma" and fear or worry about their future face (37). Communication barriers may exist and make it challenging for patients to articulate their needs and feelings. Some examples include inability to speak due to a tracheostomy, transplanted intraoral components, inability to open eyes due to swelling, and lack of motor function in the facial allograft (11). Nurses must be aware of their tone of voice, word choice, and nonverbal cues that may affect the patient's perception of care and comfort. It has also been reported that the nurse's continuous presence with an intensive care patient undergoing mechanical ventilation is an effective intervention (38). Using nursing presence as the basis of the intervention helps build trust and relaxes the patient. A nurse's use of presence can help decrease a patient's anxiety and change the focus from a highly technical environment, to a more personal and healing one (38).

We present a case report of a patient that had no problems postoperatively that was not controlled in the intensive care unit. Face transplantation surgeries require intense concentration and should only be performed by a team of experts with well-defined duties. It is safe to assume that the nurses' responsibility of effective drug management, patient follow-up, and interventions aimed to relieve the patient contribute significantly to the healing process of the patient.

Ethics

Informed Consent: Written informed consent was obtained from by patient.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Ö.Ö., Ö.Ö., Concept: Ö.Ö., Ö.Ö., E.K., E.I., Design: Ö.Ö., Ö.Ö., E.K., E.I., Data Collection or Processing: E.K., E.I., N.A., F.K., Analysis or Interpretation: Ö.Ö., Ö.Ö., E.K., E.I., Literature Search: E.K., E.I., Writing: E.K.

Conflict of Interest: No conflict of interest between authors

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References

- Bueno EM, Diaz-Siso JR, Pomahac B. A Multidisciplinary protocol for face transplantation at Brigham and Women's Hospital. *J Plast Reconstr Aesthet Surg* 2011;64:1572-9.
- Butler PE, Clarke A, Hettiaratchy S. Facial Transplantation. *BMJ* 2005;331:1349-50.
- Butler PE, Hettiaratchy S, Clarke A. Managing the risks of facial transplantation. *Lancet* 2006;368:561-3.
- Devauchelle B, Badet L, Lengele B, Morelon E, Testelin S, Michallet M, et al. First human face allograft: early report. *Lancet* 2006;368:203-9.
- Morris P, Bradley A, Doyal L, Earley M, Hagen P, Milling M, et al. Face Transplantation: A Review of the Technical, Immunological, Psychological and Clinical Issues with Recommendations for Good Practice. *Transplantation* 2007;83:109-28.
- Dubernard JM, Lengele B, Morelon E, Testelin S, Badet L, Moure C, et al. Outcomes 18 months after the First Human Partial Face Transplantation. *N Engl J Med* 2007;357:2451-60.
- Infante-Cossio P, Barrera-Pulido F, Gomez-Cia T, Sicilia-Castro D, Garcia-Perla-Garcia A, Gacto-Sanchez P, et al. Facial Transplantation: a concise update. *Med Oral Patol Oral Cir Bucal* 2013;18:263-71.
- Meningaud JP, Donsimoni JM, Lantieri L. Facial allograft transplantation and basal implantology (cortically anchored disk-design implants) *Rev Stomatol Chir Maxillofac* 2009;110:353-8.
- Turkish Medical Association (2012). Report of composite tissue transplants. Available at: http://www.tpcd.org.tr/uploads/media/kompozitrpr_2012.pdf. Accessed January 24, 2014.
- Sedaghati-nia A, Gilton A, Liger C, Binhas M, Cook F, Ait-Mammar B, et al. Anaesthesia and intensive care management of face transplantation. *Br J Anaesth* 2013;111:600-6.
- Sweeney N, Calame-Mars G, Dojlidko D, Frank-Bader M, Keller R, Waterman J. Preparing for a face transplant: development of a comprehensive nursing educational program. *Prog Transplant* 2015;25:316-20.
- Wain RA, Tehrani H. The Plastic & Reconstructive Mohs Surgery Service. *J Plast Reconstr Aesthet Surg* 2014;67:331-5.
- Sole ML, Su X, Talbert S, Penoyer DA, Kalita S, Jimenez E, et al. Evaluation of an Intervention to Maintain Endotracheal Tube Cuff Pressure Within Therapeutic Range. *Am J Crit Care* 2011;20:109-17.
- Nseir S, Brisson H, Marquette CH, Chaud P, Di Pompeo C, Diarra M, et al. Variations in endotracheal cuff pressure in intubated critically ill patients: prevalence and risk factors. *Eur J Anaesthesiol* 2009;26:229-34.
- Day T, Farnell S, Wilson-Barnett J. Suctioning: a review of current research recommendations. *Intensive Crit Care Nurs* 2002;8:79-89.
- Pedersen CM, Rosendahl-Nielsen M, Hjermland J, Egerod I. Endotracheal suctioning of the adult intubated patient—What is the evidence? *Intensive Crit Care Nurs* 2009;25:21-30.
- Pereira CM, Figueiredo ME, Carvalho R, Catre D, Assunção JP. Anesthesia and surgical microvascular flaps. *Rev Bras Anesthesiol* 2012;62:563-78.
- Haskins N. Intensive nursing care of patients with a microvascular free flap after maxillofacial surgery. *Intensive Crit Care Nurs* 1998;14:225-30.
- Kaplow R. Safety of patient transferred from the operating room to intensive care unit. *Crit Care Nurse* 2013;33:68-70.
- Barone CD, Pablo CS, Barone GW. Postanesthetic care in the critical care unit. *Crit Care Nurse* 2004;24:38-44.
- Wade CR, Sikora JH, Augustine SM. Postoperative nursing care of cardiac transplant recipient. *Crit Care Nurs Q* 2004;27:17-28.
- Marsh M, Elliott S, Anand R, Brennan PA. Early postoperative care for free flap head & neck reconstructive surgery – a national survey of practice. *Br J Oral Maxillofac Surg* 2009;47:182-5.
- Gomez-Cia T, Sicilia-Castro D, Infante-Cossio P, Barrera-Pulido F, Gacto-Sanchez P, Lagares-Borrego A, et al. Second human facial allotransplantation to restore a severe defect following radical resection of bilateral massive plexiform neurofibromas. *Plast Reconstr Surg* 2011;127:995-6.
- Hinojosa-Pérez R, Porras-López M, Escobresca-Ortega AM, Herruzo Avilés A, León A, Noval JA, et al. Severe rhabdomyolysis after allogeneic transplantation of facial structures: a case report. *Transplant Proc* 2010;42:3081-2.
- Guo S, Han Y, Zhang X, Lu B, Yi C, Zhang H, et al. Human facial allotransplantation: a 2-year follow-up study. *Lancet* 2008;372:631-8.
- Lantieri L, Meningaud JP, Grimbert P, Bellivier F, Lefaucheur JP, Ortonne N, et al. Repair of the lower and middle parts of the face by composite tissue allotransplantation in a patient with massive plexiform neurofibroma: a 1-year follow-up study. *Lancet* 2008;372:639-45.
- Azzam PN, Alam A. Pain in the ICU: A Psychiatric Perspective. *J Intensive Care Med* 2013;28:140-50.
- Abdel-Galil K, Mitchell D. Postoperative monitoring of microsurgical free tissue transfers for head and neck reconstruction: a systematic review of current techniques-Part I. Non-invasive techniques. *Br J Oral Maxillofac Surg* 2009;4:351-5.
- Salgado JC, Chim H, Schoenoff S, Mardini S. Postoperative care and monitoring of the reconstructed head and neck patient. *Semin Plast Surg* 2010;24:281-7.
- Pushparaj S, Boyce H, Chisholm D. Anaesthesia for onco-plastic reconstructive surgery. *Current Anaesthesia & Critical Care* 2009;20:18-21.
- Quinlan J. Anaesthesia for reconstructive surgery. *Anaesth Intensive Care* 2006;7:31-5.
- Jeran L. Clinical guideline for the prevention of unplanned perioperative hypothermia. *J Perianesth Nurse* 2001;16:305-14.
- Khalaila R, Zbidat W, Anwar K, Bayya A, Linton DM, Sviri S. Communication Difficulties and Psychoemotional Distress in Patients Receiving Mechanical Ventilation. *Am J Crit Care* 2011;20:470-8.
- Barr J, Fraser GL, Puntillo K, Ely EW, Gélinas C, Dasta JF, et al. Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. *Crit Care Med* 2013;41:263-306.
- McKinley S, Stein-Parbury J, Chehel-nabi A, Lovas J. Assessment of Anxiety in Intensive Care Patients by Using the Faces Anxiety Scale. *Am J Crit Care* 2004;13:146-52.
- Perpiñá-Galvañ J, Richart-Martínez M. Scales for Evaluating Self-Perceived Anxiety Levels in Patients Admitted to Intensive Care Units: a review. *Am J Crit Care* 2009;18:571-80.
- Brill SE, Clarke A, Veale DM, Butler PE. Psychological management and body image issues in facial transplantation. *Body Image* 2006;3:1-15.
- Tracy MF, Chlan L. Nonpharmacological interventions to manage common symptoms in patients receiving mechanical ventilation. *Crit Care Nurse* 2011;31:19-28.