Association between Frequency of Prosthesis Cleaning and the Discharge Characteristics and the Tear Film in Subjects with Anophthalmic Socket after Evisceration with Dermis Fat Graft

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Abstract

AIM: To analyze the associations between frequency of prosthesis cleaning with the discharge characteristics and the tear film in subjects with anophthalmic socket post evisceration with dermis fat graft.

SUBJECTS AND METHODS: This study is an analytic observational with cross sectional design study with control. The subjects of the study were unilateral acquired anophthalmic socket after evisceration with dermis fat graft at University of Sumatera Utara General Hospital which amounts to 30 subjects or 60 eyes (30 unilateral anophthalmic sockets, 30 contralateral eyes). Data was obtained from April 2018 to May 2018.

RESULT: There was a significant association between frequency of prosthesis cleaning with the frequency of discharge (P = 0.001) and tear film quantity (P = 0.024). There is also significant association between the tear film quantity and the frequency of discharge (P = 0.024).

CONCLUSION: There was a significant association between frequency of prosthesis cleaning with the frequency of discharge and the tear film in subjects with Acquired Unilateral anophthalmic socket post-evisceration with dermis fat graft.

Introduction

After enucleation or evisceration is done, the main goal is to rehabilitate the patient to look normal and live a stress-free life. An ideal ocular prosthesis can be placed 4 to 8 weeks after evisceration or enucleation so that the patient feels comfortable and satisfied cosmetically [1], [2], [3], [4].

Discharge is the second problem after normal eye health, affecting 93% of patients with anophthalmic sockets and having various discharge characteristics. Dry eyes are also a problem in anophthalmic socket patients associated with prosthesis intolerance [5], [6].

Each patient individually has different intervals to remove and clean the prosthesis. Recommendations from the ophthalmologist for the frequency of cleaning of ocular prosthesis also vary. The American Society of Ocularists recommends the removal and cleaning of the prosthesis once a month, but must be inserting immediately after socket irrigation [1], [4].

Subjects and Methods

This is an analytic observational study with cross sectional design with control. The study subjects were all patients who admitted to the Oculoplasty Oncology and Reconstruction Division of University of Sumatera Utara General Hospital Medan who was diagnosed with unilateral acquired anophthalmic socket-post-evisceration with dermis fat graft from April to May 2018. The sample size was 30 people with age over 18 years. First, the patient identity record that
meets the sample selection criteria and then checks the anterior segment with slit lamp. Followed by schirmer I test were performed for both eyes, the anophthalmic socket side and normal eye. Patients were asked to complete the questionnaire, that was a modification of Pine and associates questionnaire (under the supervision of the researcher). All results are recorded and analyzed.

Figure 1: Questionnaire with visual analog scale (10 is the most severe) for self-reporting of the discharge characteristics (frequency, color, and volume) and frequency of prosthesis removal in subjects

### Results

There were 30 consecutively recruited subjects with acquired unilateral anophthalmic socket post-evisceration with dermis fat graft, which they were drawn although with a higher ratio of men. The median age of participants was 46, and the youngest participant was 18.

Table 1: Characteristics of Subjects with Acquired Unilateral Anophthalmic Socket Post-Evisceration with Dermis Fat Graft

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Study participants, n =30 (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>21 (70%)</td>
</tr>
<tr>
<td>Female</td>
<td>9 (30%)</td>
</tr>
<tr>
<td>Median age</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>46 years (range 22 - 75) (70%)</td>
</tr>
<tr>
<td>Female</td>
<td>50 years (range 18 - 60) (30%)</td>
</tr>
<tr>
<td>Median age at eye loss</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>34 years (range 10 - 65) (70%)</td>
</tr>
<tr>
<td>Female</td>
<td>26 years (range 5 - 57) (30%)</td>
</tr>
<tr>
<td>Anophthalmic side</td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>17 (56.7%)</td>
</tr>
<tr>
<td>Right</td>
<td>13 (43.3%)</td>
</tr>
<tr>
<td>Reason for eye loss</td>
<td></td>
</tr>
<tr>
<td>Accident</td>
<td>16 (53.3%)</td>
</tr>
<tr>
<td>Medical</td>
<td>14 (48.7%)</td>
</tr>
<tr>
<td>Median time since prosthesis fitted</td>
<td>12 years (range 1 - 35) (100%)</td>
</tr>
</tbody>
</table>

All the subjects scored 1 or more for all the items in the questionnaire with regard to the discharge characteristics (frequency, color, volume) and frequency of prosthesis cleaning (Table 2). Table 2 shows that of 30 subjects with acquired unilateral anophthalmic socket post-evisceration with dermis fat graft, most frequency of discharge were frequent in 18 people (60%), the color of discharge was mucopurulent in 21 people (70%), and the viscosity of discharge was thicker in 19 people (63.3%).

Table 2: Discharge Characteristics and Frequency of Prosthesis Cleaning Among 30 Subjects with Acquired Unilateral Anophthalmic Socket Post-Evisceration with Dermis Fat Graft

<table>
<thead>
<tr>
<th>Discharge Characteristic</th>
<th>Frequency (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Less frequent</td>
<td>12 (40%)</td>
</tr>
<tr>
<td></td>
<td>Frequent</td>
<td>18 (60%)</td>
</tr>
<tr>
<td>Color</td>
<td>Mucoid</td>
<td>9 (30%)</td>
</tr>
<tr>
<td></td>
<td>Mucopurulent</td>
<td>21 (70%)</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Runny</td>
<td>11 (36.7%)</td>
</tr>
<tr>
<td></td>
<td>Thick</td>
<td>19 (63.3%)</td>
</tr>
</tbody>
</table>

The anophthalmic socket side, as compared to the normal side, showed a significantly lower Schirmer value, it can be concluded that there is a significant difference in the quantity of tear film between anophthalmic socket side and normal side (Table 3).

Table 3: Comparing the ResultsofSchirmer I TestBetween Anophthalmic Socket and Normal Eye of 30 Subjects With Acquired Unilateral Anophthalmic Socket Post-Evisceration with Dermis Fat Graft

<table>
<thead>
<tr>
<th>Anophthalmic Socket</th>
<th>Normal</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)[range]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schirmer I Test, mm</td>
<td>8 (2.31) [5-12]</td>
<td>15 (3.64) [10-25]</td>
</tr>
</tbody>
</table>

There was a significant associations between frequency of prosthesis cleaning with discharge and the frequency of discharge in the subjects with acquired unilateral anophthalmic socket post-evisceration with dermis fat graft, P = 0.001 (P <0.05) ,where the frequency of discharge was frequent in subjects who more frequently cleaning the prosthesis (Table 4).

Table 4: Associations Between Frequency of Prosthesis Cleaning withDischargeCharacteristics Among 30 Subjects with Acquired Unilateral Anophthalmic Socket Post-Evisceration with Dermis Fat Graft

<table>
<thead>
<tr>
<th>Discharge Characteristics</th>
<th>Frequency of Prosthesis Cleaning</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>Less frequent</td>
<td>Frequent</td>
</tr>
<tr>
<td></td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>Frequency</td>
<td>Less frequent</td>
<td>12 (40%)</td>
</tr>
<tr>
<td></td>
<td>Frequent</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Color</td>
<td>Mucoid</td>
<td>6 (20%)</td>
</tr>
<tr>
<td></td>
<td>Mucopurulent</td>
<td>6 (20%)</td>
</tr>
<tr>
<td>Viscosity</td>
<td>Runny</td>
<td>6 (20%)</td>
</tr>
<tr>
<td></td>
<td>Thick</td>
<td>6 (20%)</td>
</tr>
</tbody>
</table>

There was a significant associations P =
0.024 (P < 0.05) between the frequency of prosthesis cleaning and the quantity of tear film in the subjects with acquired unilateral anophthalmic socket post-evisceration with dermis fat graft (Table 5).

The 30 subjects with acquired unilateral anophthalmic socket post-evisceration with dermis fat graft, showed a significantly lower Schirmer value in the subject with frequent prosthesis cleaning than subject with less frequent prosthesis cleaning (Table 5).

Table 5: Associations between Frequency of Prosthesis Cleaning with Tear Film Among 30 Subjects with Acquired Unilateral Anophthalmic Socket Post-Evisceration with Dermis Fat Graft

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequency of Prosthesis Cleaning</th>
<th>Total</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Less frequent</td>
<td>Frequent</td>
<td>mean</td>
</tr>
<tr>
<td>Schirmer I Test mm</td>
<td>9.08</td>
<td>12</td>
<td>7.17</td>
</tr>
</tbody>
</table>

A significant association (P = 0.024) between the quantity of tear film with the frequent of discharge, which the tear film quantity is lower than less frequency of discharge (Table 6).

Table 6: Associations between Tear Film with Discharge Characteristics Among 30 Subjects with Acquired Unilateral Anophthalmic Socket Post-Evisceration with Dermis Fat Graft

<table>
<thead>
<tr>
<th>Discharge Characteristics</th>
<th>Schirmer I Test mm</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>mean</td>
<td>mm</td>
</tr>
<tr>
<td>Less frequent</td>
<td>9.08</td>
<td>12</td>
</tr>
<tr>
<td>Frequent</td>
<td>7.17</td>
<td>18</td>
</tr>
<tr>
<td>Color</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mucoid</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Mucopurulent</td>
<td>7.48</td>
<td>21</td>
</tr>
<tr>
<td>Viscosity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Runny</td>
<td>8.27</td>
<td>11</td>
</tr>
<tr>
<td>Thick</td>
<td>7.74</td>
<td>19</td>
</tr>
</tbody>
</table>

Discussion

The anophthalmic socket varies between individuals and their condition and shape are affected by loss of eyes, surgical techniques, types of implants that have accommodated a prosthetic eye and age. This problem will certainly affect the quality of life of patients. This problem will certainly affect the quality of life of patients. Problems that can be encountered in the patients anophthalmic socket are the presence of discharge, dry eye and poor prostheses cosmetics such as not symmetrical with the other eye, the size of the prosthesis is too large or small can cause changes in the eyelid position (pseudoptosis or eyelid retraction), decreased motility prosthesis, discomfort and pain in the anophthalmic socket. Patients with anophthalmia sockets need rehabilitation to look normal and live a stress-free life [1], [2], [5].

Table 1 shows that the most from 30 subjects with acquired unilateral anophthalmic socket post-evisceration with dermis fat graft in males is 21 people (70%), while in women is 9 people (30%). The mean age of the study in males is 46 years and women are 50 years old. The mean age at eye loss in males is 34 years and women are 26 years old. The anophthalmicsides in the right eye as 17 people (56.7%) and left eye is 13 persons (43.3%). The most reason for eye loss in the study is accident in 16 people (53.3%), while the medical reason is 14 people (46.7%). The median time since prosthesis fitting is 12 years.

Discharge a common complaint of an anophthalmic socket patient that affects the quality of his life and there may be many underlying causes. Discharge is the glandular product of the bulbi conjunctiva released by goblet cells. The most common cause is giant papillary conjunctivitis. The pathogenesis is a combination of the immunological response to the mechanical trauma of the prosthesis [6], [7].

Using a visual analog scale for doing self-reporting of discharge characteristics (frequency, rare or frequent), color (mucoid or mucopurulent), and viscosity (runny or thick) [7], [8].

Table 2 shows subject with frequent discharges 18 people (60%), while less frequent discharges 12 people (40%). The most color of discharge is mucopurulent in 21 people (70%), while mucoid in 9 people (30%). The most viscosity of discharge is thick in 19 people (63.3%), while the runny in 11 people (36.7%). Subject with frequent prosthesis cleaning is 18 people (60%) have higher frequency of discharge than subjects with less frequent prosthesis cleaning is 12 people (40%).

Losing of eyeball is accompanied by a rearrangement of the conjunctiva and lacrimal apparatus. Furthermore, following the fitting of an ocular prosthesis, cytological features of the conjunctiva undergo a change, as does the nature of tears. After enucleation or evisceration, the loose conjunctival lining of the newly formed socket adjusts as it heals and there is an inevitable loss of conjunctiva area [1], [2].

The provision of a prosthetic eye restores the fornices, which may have temporarily fore shortened, and returns the eyelids to their original positions where they resume their normal function. The presence of a prosthesis is necessary for basic tear distribution and drainage to resume although it may not operate as efficiently as previously. Lacrimal system efficacy in the anophthalmic socket (with structures intact) greatly depends upon the fit of the prosthesis. The prosthesis entering the anophthalmic socket will be contact with the conjunctiva, the eyelid will moisten the prosthesis with ocular fluid and rest on the surface of the sediment with ocular fluid and collecting precipitate on its surface. Protea intolerance, tear delivery impeded by conjunctival scarring or lack of sensory reflex impulse to the
lacrimal gland of the ocular surface is often associated as a cause of dry eye in the anophthalmic socket patient [8], [9], [10], [11], [12].

In Table 3 showed that the results of the Independent t-Test can be concluded that there is a significant difference in the quantity of the tear film between the anophthalmic socket with the normal eye, where the quantity of the tear film in the anophthalmic socket is lower than the eye in the normal eye. It is in line with study by Allen at al who reported that the tear volume of the anophthalmic socket is not the same as the normal eye, as the tear volume on the anophthalmia socket have been less than in the normal eye. However, unlike previous study by Kim et al., showed that no statistically significant difference in Schirmer test results between anophthalmic socket with normal eye [12].

Recommendations for the cleaning of ocular prosthesis are no more than 1 month and no less than six months. A monthly cleaning of the prosthesis to remove the precipitate from the prosthesis surface and the ability of the conjunctiva to increase lubricating fluid on the socket reduces mechanical irritation resulting from friction of the prosthesis with conjunctiva and reduces the production of secretions. Mechanical irritation may be caused by the removal of the prosthesis, exposure to foreign materials or bacteria during the cleaning of the prosthesis so that it enters the socket. The presence of sediment is associated with fewer conjunctival inflammations and discharge, and that the sediment is not due to conjunctival inflammation in patients who do not frequently clear the prosthesis. All patients should clean their prosthesis at least six months, since the amount of sediment accumulated during this time may be sufficient before the occurrence of conditions required for GPC or for deposits begin to disrupt the interpalpebral zone where the precipitate dries and physically disrupts the conjunctiva when it flashes [1], [9].

It is assumed that there is an irritating or disruptive effect on the conjunctival anophthalmic socket associated with the removal and reinsertion of the prosthesis during cleaning of the prosthesis. Little is known about the severity of this effect or how long it lasts, it takes further research to determine the severity of conjunctival inflammation to measure inflammation before and after remove and reinsert the prosthesis [7]. Rodiah and Monica, the using contact lens may cause conjunctival inflammation and caused dry eye syndrome [13]. The Chi-Square test shows subjects with frequent prosthesis cleaning had a significantly higher frequency of discharge than subject with less frequent prosthesis removal, whereas color and volume of discharge were not significantly different between these 2 groups. It is in line with study by Pine KR et al., who reported thateassociations were found between discharge frequency and cleaning regimes with more frequent cleaning accompanying more frequent discharge. No associations were found between color of discharge and cleaning regimes, but viscosity was associated with cleaning regimes and years of wearing with more frequent cleaning accompanying more viscous discharge. Different with previous research by Kim et al., and Chang WJ et al., compared inflammatory conjunctival of anophthalmic socket with contralateral eyes, showed no association between conjunctival inflammation and aspects of prosthetic use, including the frequency cleaning of the prosthesis [7]. Many studies have been explained the etiology of discharge most common and disturbing patient anophthalmic socket. There are two theories about the etiology of discharge: 1) growth of bacterial, specific of the infection process; and 2) reduced tear production [9].

In Table 5 with the Independent t-Test showed significant association (P = 0.024) between the frequency of cleaning prosthesis with the quantity of tear film in subject with anophthalmic socket, where the tear film quantity is lower in the subject with frequent prosthesis cleaning than subject with less frequent prosthesis cleaning. It is in line with study by Kim et al., specimens from patients who cleaned their prosthesis once a day showed significantly less goblet cell density and greater nucleus to cytoplasm ratios at the superior tarsal conjunctiva than those who cleaned less often. The results of Kim et al., did not agree with the earlier results of an investigation by Chang et al., which found no statistical difference in goblet cell density or epithelial cell morphology in 12 anophthalmic patients with giant papillary conjunctivitis.

In Table 6, shows the results of Independent t-Test is a significant association (P = 0.024) between the quantity of tear film with the frequent of discharge, which the tear film quantity is lower than less frequency of discharge, whereas color (P = 0.100) and viscosity of discharge (P = 0.551) were not significantly different between these 2 groups. Allen et al., or Fett et al., directly linked low basic tear production or the use of prosthetic lubrication with the discharge problem.

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Robert Djagbletey, Ebenezer Owusu Darkwa, Papa Kobina Gyekye deGraft-Johnson, Daniel Akwanfo Yaw Sottie, Raymond Essuman, George Aryee, Ernest Anitye
Association between Frequency of Prosthesis Cleaning and the Discharge Characteristics and the Tear Film in Subjects with Anophthalmic Socket after Evicreation with Dermis Fat Graft
Tari Adrian, Rodiah Rahmawaty Lubis, T. Siti Harilza Zubaidah
2012-2016

Moxifloxacin in the Outpatient Treatment of Moderate Exacerbations of Chronic Obstructive Pulmonary Disease
Jordan Minov, Sasho Stoleski, Tatjana Petrova, Kristin Vasilevska, Dragan Mijakoski, Jovanka Bislimovska-Karadzhinska
2017-2022

The Prevalence of Risk Factors for the Development of Bacteraemia in Children
Sayed Yousef Mojtahedi, Aliakbar Rahbarimanesh, Leila Khedmat, Anahita Izadi
2023-2029

The Effects of Filgrastim on Complications of Patients with Cerebral Hemorrhage Due To Head Trauma
Morteza Qaribi, Arash Yazdanbakhsh, Koorosh Ahmadi, Mohammad Reza Maghsoudi, Vagefe Farshin, Ali Ahmadi, Abolfazl Jokar
2030-2034

Predictors of Glucose Control in Children and Adolescents with Type 1 Diabetes: Results of a Cross-Sectional Study in Khartoum, Sudan
Zainab Taha, Zeinab Eltoum, Sidiga Washi
2035-2039
IGF1R Gene Alterations in Children Born Small for Gestitional Age (SGA)
Aleksandra Janchevska, Marina Krstevska-Konstantinova, Heike Pfäffle, Marina Schlicke, Nevenka Laban, Velibor Tasic, Zoran Gucev, Kristina Mironska, Aleksandar Dimovski, Jürgen Kratzsch, Jürgen Klammt, Roland Pfäffle
2040-2044

A Comparison of the Effects of Dexmedetomidine and Propofol in Controlling the Hemodynamic Responses after Intubation: A Double-Blind, Randomized, Clinical Trial Study
Alireza Kamali, Mehrdad Taghizadeh, Mohtaram Esfandiar, Amin Shams Akhtari
2045-2050

Therapeutic Effect of Adding Magnesium Sulfate in Treatment of Organophosphorus Poisoning
Fatemeh Jamshidi, Arash Yazdanbakhsh, Mohammad Jamalian, Peyman Khademhosseini, Koroosh Ahmadi, Alireza Sistani, Abolfazl Jokar
2051-2056

Jafar Bazyar, Katayoun Jahangiri, Hamid Safarpour, Meysam Safi Keykaleh, Saeideh Varasteh, Leila Malekyan, Ehsan Mohammadi
2057-2061

The Comparison of Simple Anthropometric and Biochemical Parameters for Predicting Liver Steatosis in Obese Balinese Young Women
I Wayan Weta, Tjokorda Gde Bagus Mahadewa, Wayan Putu Sutirtayasa, AAN Subawa, Firman P. Sitanggang, I Putu Eka Widhyadarma
2062-2066
Association between Increased Matrix Metalloproteinase-9 (MMP-9) Levels with Hyperglycaemia Incidence in Acute Ischemic Stroke Patients
Ismail Setyopranoto, Rusdy Ghazali Malueka, Andre Stefanus Panggabean, I Putu Eka Widyadharma, Ahmad Hamim Sadewa, Rusdi Lamsudin, Samekto Wibowo
2067-2072

Tumescent Local Infiltration Anesthesia for Mini Abdominoplasty with Liposuction
Ahmed Abdalla Mohamed, Tamer Fayez Safan, Hamed Fathy Hamed, Maged Abdelwahab Abdelaziz Elgendy
2073-2078

Treatment of Depressive Conditions in Pregnancy
Slavica Arsova, Stojan Bajraktarov, Kadri Hadzihamza, Viktor Isijanovski
2079-2083

Does the Presence of Diabetes Mellitus Make a Difference in Pharmacological Stress Echocardiography Outcome Results?
Valentina Andova, Ljubica Georgievskaya-Ismail, Elizabeta Srbinovska, Biljana Janeska
2084-2090

Comparison of IFN-γ Levels in Children with Tuberculosis Disease (TB) and Latent Tuberculosis Infection (LTBI)
Katerina Boskovska, Stojka Naceva-Fustic, Liljana Simonovska, Mirjana Dilberovska, Dragan Dacevski, Gorica Popova, Ivana Arnaudova, Irena Cakalarovska
2091-2096

Influence of Combined Therapy on Generation of Neutrophil Extracellular Traps in Patients with Cervical Cancer
Yuriy Fomenko, Yevgeniya Kolesnikova, Irina Beynikova, Larissa Muravyova, Valentina Sirotka, Ryszhan Bakirova
2097-2100
The Relationship between Clinical Findings of Shoulder Joint with Bone Damage of Shoulder Joint in Patients with Isolated Shoulder Blunt Trauma
Amin Zamani, Mohammad Davood Sharifi, Roohe Farzaneh, Hamideh Feiz Disfani, Behrang Rezvani Kakhki, Amir Masoud Hashemian
2101-2106

Elevated High-Sensitivity C-Reactive Protein And Interleukin-6 Plasma As Risk Factors For Symptomatic Lumbar Osteoarthritis In Postmenopausal Women
I Ketut Suyasa, Anak Agung Wiradewi Lestari, I Gusti Ngurah Yudhi Setiawan, Tjokorda Gde Bagus Mahadewa, I Putu Eka Widyadharma
2107-2110

The Levels of Hepcidin and Erythropoietin in Pregnant Women with Anemia of Various Geneses
Dmitriy Vazenmiller, Olga Ponamaryova, Larisa Muravlyova, Vilen Molotov-Luchanskiy, Dmitriy Klyuyev, Riszhan Bakirova, Zhanna Amirbekova
2111-2114

CD4 and Its Relevance to Advanced Glycation End Products in Tuberculosis Patients with Co-morbidity Diabetes
Sry Suryani Widjaja, - Rusdiana, Maya Savira
2115-2118

Epidemiological Characteristics of Work-Related Ocular Trauma among the Carpenters in Medan, Indonesia
Rodiah Rahmawaty Lubis, Vera Limanto, Ruri Putri, Arlina Nurbaiti Lubis, Nurfida Khairina Arrasyid
2119-2122

Procalcitonin Level in Non-Small Cell Lung Cancer Patients among Indonesian Population
Noni Novisari Soeroso, Muhammad Faiz Tanjung, Dina Afiani, Andika Pradana, Setia Putra Tarigan, Arlinda Sari Wahyuni
2123-2127
Outcomes of Operative Management of 96 Cases with Traumatic Retroperitoneal Hematoma: A Single-Institution Experience
Harth Mohamed Kamber, Tawfiq Jasim Mohammed Al-Marzooq, Haider Raheem Neamah, Qays Ahmed Hassan
2128-2132

CASE REPORT

Acupuncture Treatment after Shoulder Arthroscopy after Recurrent Dislocations
Jihe Zhu, Blagica Arsovska, Kristina Kozovska
2133-2135

“Two Stones on One Bird”: A Case Report on Severe Biphasic Anaphylaxis Masquerading as Life-Threatening Acute Asthma
Alvin Oliver Payus, Azliza Ibrahim, Norlaila Mustafa
2136-2138

Incidental Finding Of Hyperreactio Luteinalis during Caesarean Section in Twin Pregnancy
Ante Omazic, Senka Sabolovic-Rudman, Ivka Djakovic, Hrvojka Soljacic-Vranes, Vesna Kosec
2139-2141

Allergic Contact Dermatitis, Angioneurotic Edema and Conjunctivitis in a Patient with Autoimmune Thrombocytopenia – A Clinical Case
Svetlan Dermendzhiev, Mariya Vlado Ivanovska, Tihomir Dermendzhiev
2142-2146
High-Risk BCC Of the Lower Eyelid in Patient with Presternal Located Cutaneous Melanoma and BCC Of the Shoulder: Melolabial Advancement Flap Combined with Undermining Surgical Approach As Promising Complex One Step Treatment Option!
Georgi Tchernev, Ilia Lozev, Ivan Pidakev, Irina Yungareva, Tanya Naskova-Popova, Ivanka Temelkova
2147-2151

Eruptive Xanthomas – Two Case Reports With Distinct Features
Uwe Wollina, André Koch, Gesina Hansel, Jacqueline Schönlebe
2152-2154

Multiple Primary Cutaneous Melanomas in a Bulgarian Patient: The Possible Role of One Step Melanoma Surgery (OSMS) As the Most Adequate Treatment Approach!
Georgi Tchernev, Ivanka Temelkova
2155-2160

A Successful Tracheal Resection and Anastomosis in Papillary Thyroid Carcinoma with Tracheal Invasion
I Gede Budhi Setiawan, Putu Anda Tusta Adiputra
2161-2164

Retained Surgical Items in Inguinal Canal: A Case Report and Literature Review
Amer Hashim Al Ani, Mohammad Bakri Hammami, Obaidah M. Mukhles Adi
2165-2167

DENTAL SCIENCE

Effect of Denture Base Reinforcement Using Light Cured E- Glass Fibers on the Level of Salivary Immunoglobulin A
Different Materials Used as Denture Retainers and Their Colour Stability
Sherif A. Sadek, Wessam M. Dehis, Hala Hassan
2173-2179

Evaluation of the Effect of Combined Low Energy Laser Application and Micro-Osteoperforations versus the Effect of Application of Each Technique Separately On the Rate of Orthodontic Tooth Movement
Ahmed Nasef Abdelhameed, Wael Mohamed Mubarak Refai
2180-2185

Microtensile Bond Strength of Composite to Enamel Using Universal Adhesive with/without Acid Etching Compared To Etch and Rinse and Self-Etch Bonding Agents
Hoda Pouyanfar, Elaheh Seyed Tabaii, Samaneh Aghazadeh, Seyyed Pedram Tabatabaei Navaei Nobari, Mohammad Moslem Imani
2186-2192

The Effect of Gates-Glidden Drills on the Quality of Root Canal Treatment by Pre-Clinical Dental Students
Roohollah Sharifi, Amin Torabi, Reza Hatam, Nafiseh Nikkerdar, Hamid Reza Mozaffari, Mohsen Safaei, Seyed Mojtaba Amiri
2193-2197

PUBLIC HEALTH

The Correlation between Adherence and Asthma Patients Quality of Life in Medan, Indonesia
Arlinda Sari Wahyuni, Rozaimah Zain Hamid, Adang Bachtiar, Nerdy Nerdy
2198-2205
Evaluate the Effect of Education Interventions in the Prevention of Diabetic Foot Ulcers through Knowledge of the Disease and Self-Care Practices in Saudi Arabia
Nagwa Ahmed Mohamed, Reham Hamed Kersha
2206-2213

The Freshman Weight Gain Phenomenon: Does It Apply To Lebanese Students?
Suzan A. Haidar, Nanne K. de Vries, Dimitrios Papandreou, Rana Rizk, Mirey Karavetian
2214-2220

Rocky Road Ahead Of Nursing Presence in the Oncology Care Unit: A Qualitative Study
Fereshteh Araghian Mojarad, Leila Jouybari, Akram Sanagoo
2221-2227

The Relationship between Nurse’s Job Stress and Patient Safety
Meysam Safi Keykaleh, Hamid Safarpour, Shiva Yousefian, Farshad Faghisolouk, Ehsan Mohammadi, Zohreh Ghomian
2228-2232

Effect of the Living Environment on falls among the Elderly in Urmia
Seyed Saeed Mazloomy Mahmoodabad, Moradali Zareipour, Mohsen Askarishahi, Alireza Beigomi
2233-2238

REVIEW ARTICLE

S100B Serum Level as a Mortality Predictor for Traumatic Brain Injury: A Meta-Analysis
Nyoman Golden, Tjokorda Gde Bagus Mahadewa, Citra Aryanti, I Putu Eka Widyadharna
2239-2244
Artificial Reproductive Technology – A Risk Factor for Retinopathy of Prematurity

Kalina Trifonova, Kiril Slaveykov, Hristo Mumdzhiiev, Dimitar Dzhelebov
2245-2249

The Relationship between Resiliency and Burnout in Iranian Nurses: A Systematic Review and Meta-analysis

Kolsoum Deldar, Razieh Froutan, Sahar Dalvand, Reza Ghanei Ghashlagh, Seyed Reza Mazloum
2250-2256

Hydrofluoric Acid: Burns and Systemic Toxicity, Protective Measures, Immediate and Hospital Medical Treatment

Emilija Bajraktarova-Valjakova, Vesna Korunoska-Stevkovska, Silvana Georgieva, Kiro Ivanovski, Cvetanka Bajraktarova-Misevska, Aneta Mijoska, Anita Grozdanov
2257-2269

Seborrheic Keratoses – The Most Common Benign Skin Tumor of Humans. Clinical presentation and an update on pathogenesis and treatment options

Uwe Wollina
2270-2275