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Did COVID outbreak influence our management of skin tumors?

COVID salgını deri tümörleri yönetimimizi etkiledi mi?

Mehmet Emre Yegın[1] Ersin Gur[1]

Ecem Esma Yegın[2] Yigit Ozer Tıftıkcıoglu[1]

[1] Ege University, Faculty of Medicine, Plastic, Reconstructive & Aesthetic Surgery Department, Izmir, Turkiye

[2] Ege University, Faculty of Science, Mathematics Department, Izmir, Turkiye

ABSTRACT

Aim: COVID pandemic forced new medical protocols. COVID precautions also changed surgical algorithms causing a change in medical costs. This study aims to clarify COVID-era medical costs and underlying reasons for patients with Head & Neck (H&N) area skin tumors.

Materials and Methods: Patients which were operated for H&N tumors in our clinic before and during the COVID outbreak were retrospectively analyzed per sex, age, etiology, PPE usage, treatments, and total costs. Statistical analysis was done for any significant changes.

Results: A total of 127 patients of which 70 were operated before (G1) and 57 were operated after (G2) the COVID out-break for H&N tumors were evaluated. Mean ages were 69,94 years for G1 and 65,56 for G2. 28 BCC and 42 SCC patients were in G1 and 11 BCC and 46 SCC patients were in G2. In G1, 69 wide excisions, 44 skin graft, 17 skin flaps, 6 lymph node dissections (LNDs) were done. In G2, 56 wide excisions, 30 skin grafts, 9 skin flaps, 6 LNDs, 5 free flaps were done. G1 patients were hospitalized for a median of 2 days, while G2 patients were hospitalized for a median of 3 days. Median costs were $261,42 in G1 and $624.84 in G2. Statistical analysis with Mann-Whitney-U and Chi-Square tests revealed significant difference only between the costs. When disposable PPE was excluded, the median cost of G2 became $539.84 (G3). Statistical difference between G1 and G3 was found to be insignificant.

Conclusion: COVID changed the etiology of our patient groups. However, our treatment protocols, hospitalization lengths, and costs remain the same. Our patient profile and treatment protocols remain similar, but COVID precautions add an extra burden.

Keywords: Head, Neck, SARS-CoV-2, Skin Neoplasms.

ÖZ

Amaç: *COVID salgını yeni tıbbi protokolleri zorunlu kılmıştır. COVID önlemleri, cerrahi algoritmaları da tıbbi maliyetlerde bir değişikliğe neden olacak şekilde değiştirmiştir. Bu çalışma, Baş ve Boyun (H&N) bölgesi deri tümörü olan hastaların COVID dönemindeki tıbbi maliyetleri ve altta yatan nedenleri açıklığa kavuşturmayı amaçlamaktadır.*

Gereç ve Yöntem: *Kliniğimizde COVID salgını öncesi ve sırasında H&N tümörleri nedeniyle ameliyat edilen hastalar cinsiyet, yaş, etiyoloji, PPE kullanımı, tedaviler ve toplam maliyetlere göre geriye dönük olarak analiz edildi. Önemli değişiklikler için istatistiksel analiz yapıldı.*

Tartışma: *COVID, hasta gruplarımızın etiyolojisini değiştirmiştir. Ancak tedavi protokollerimiz, hastanede kalma sürelerimiz ve maliyetlerimiz aynı kalmıştır. Hasta profilimiz ve tedavi protokollerimiz benzer olup, yalnızca COVID önlemleri maliyete fazladan yüke sebep olmaktadır.*

Corresponding author: Mehmet Emre Yegın
Ege University, Faculty of Medicine, Plastic, Reconstructive & Aesthetic Surgery Department, Izmir, Turkey
E-mail: *mehmetemreyegin@yahoo.com*
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Sonuç: *70'i COVID salgını öncesi (G1) ve 57'si COVID salgın başlangıcı sonrası ameliyat edilmiş (G2) olmak üzere toplam 127 H&N tümörlü hasta değerlendirildi. Ortalama yaş G1 için 69,94 ve G2 için 65,56 idi. G1'de 28 BCC ve 42 SCC hastası, G2'de 11 BCC ve 46 SCC hastası olduğu görüldü.*

G1'de 69 geniş eksizyon, 44 deri grefti, 17 deri flebi, 6 lenf nodu diseksiyonu (LND) hastası mevcuttu. G2'de 56 geniş eksizyon, 30 deri grefti, 9 cilt flebi, 6 LND, 5 serbest flep hastası mevcuttu. G1 hastalarının ortalama 2 gün hastanede kaldığı, G2'deki hastaların ise ortalama 3 gün hastanede kaldığı görüldü. Ortalama maliyetler G1'de 299,66$ ve G2'de 625,91$ idi. Mann-Whitney-U (MWU testi) ve Ki-kare testiyle yapılan istatistiksel analizde, etiyolojiler ve maliyetler arasında önemli bir fark olduğu görüldü. PPE hariç tutulduğunda ise (G3), ortalama maliyet 539,84$ (G3) oldu. G1 ve G3 arasındaki farkın ise, MWU testiyle istatistiksel anlamsız olduğu bulundu.

Anahtar Sözcükler: *Baş, Boyun, Deri Tümörleri, SARS-CoV-2.*

INTRODUCTION

In December 2019, a novel pneumonia epidemic hit Wuhan and then became a pandemic in only 3 months (1). Normal life and burden of daily stresses changed to lockdown and pandemic stress that caused different morbidities (2). In this era, tumor patients of Head and Neck area (H&N) were suggested be operated in facilities with adequate labor and COVID-segregated services (3). Our hospital which was organized to serve in different buildings, nowadays have some of the clinics and burn unit allocated under service of infectious disease, pulmonology and anesthesiology departments to isolate and treat COVID-patients. Inherently, as clinicians of a tertiary care hospital, we are obliged to treat complex trauma and tumor patients, as usual.

Before COVID pandemic hit the world, only surgical masks, caps, shirts and gloves were used for most of the operations. Literature had argued and settled most of the issues about postoperative complications, costs and hospitalization lengths. Conversely, we were introduced to a novel status that we had no idea of what kind of changes we may see. Precautions were taken and changed by governments, as recent data accumulated. Therefore, in the past year, many different situations were encountered by medical professionals. In this study, we aim to find out if characteristic properties like costs of H&N skin tumor patients changed during the pandemic.

MATERIALS and METHODS

This study was designed as a single-center, retrospective study in the Ege University Hospital, Plastic & Reconstructive Surgery Clinic. The research unit is a third-level reference health center in Izmir, and about 190,000 patients were cared annually before the COVID era. The research protocol was approved by the ethical committee of Ege University Faculty of Medicine local ethics committee (Date: 31/10/2020, Number: 20-11T/23). After approval of the committee, adult patients with SCC and BCC on H&N who were operated in our clinic between 21/07/2019-31/10/2020 (a total of 468 days) were retrospectively evaluated. This date range was determined by the beginning of lockdowns and hospital arrangements for COVID pandemic in our center (11/03/2020, named as "COVID-deadline"). Before this date, patients who were treated with routine algorithms formed the pre-COVID group, and after that date, patients of which operations were done with necessary COVID precautions were recruited as the post-COVID group. Exactly 234 days were set for both pre- and post-event to build the control and study groups. An archive search was conducted to obtain data about epidemiology, operative techniques as excision/dissection, reconstruction methods as graft/flap/free flap, hospitalization lengths (LoH), and perioperative precautions were taken and treatment costs were recorded. Cost changes caused by COVID-related complications were also added if encountered. Etiologies were further divided for Basal Cell Carcinoma (BCC), Squamous cell carcinoma (SCC). Costs of the treatments were calculated as total of surgical costs including disposable gowns, disposable sheets and screening tests for COVID. For statistical analysis, G2's treatment costs were calculated excluding gown, sheet and PCR as attributed expenses of COVID precautions, also, and named as G3. All costs were calculated as US dollars ($) per exchange rate of Turkish Lira (TL) of January 2021 (7,35TL/$).

Statistical analysis was done to reveal any significance of changes between G1 and G2. IBM SPSS Statistics Version 22.0.0.0 was used for this purpose. Results were presented as medians

and interquartile ranges for numerical data and frequencies and percentages for categorical variables. The compatibility of numerical variables to normal distribution was evaluated using the Shapiro-Wilk's test. In comparison of the groups, t-test was used if the data followed parametric assumptions; the MWU test was used if the assumptions were violated, while the Chi-square test was used to compare categorical variables. A p-value of <0.05 was considered sufficient for statistical significance.

RESULTS

127 patients were found to be operated in our clinic for H&N tumors during this term. 70 patients were found to be operated before (G1), and 57 were operated after (G2) the COVID-deadline.

G1 was consisted of 48 male and 22 female patients. Mean age for male patients was 69.45 years (min. 33, max. 97). Mean age for female patients was 71.32 years (min. 43, max. 105). 28 patients were operated for BCC and 42 patients were operated for SCC. 67 patients' treatment included excision of a lesion, but only three patients were operated solitarily with dissection. Total count of dissections was 6 in this group. 43 patients had skin graft as the preferred reconstructive method. 16 patients' reconstruction was made using a flap. There was no free flap reconstruction among these patients. Total LoH of the patients was 281 days (mean 4 days/patient).

G2 was consisted of 36 male and 21 female patients. Mean age for male patients was 69.33 years (min. 33, max. 97). Mean age for female patients was 64.24 years (min. 19, max. 92). 11 patients were operated for BCC and 46 patients were operated for SCC. All patients' treatment included excision of a lesion. Total count of dissections was 6 in this group. 30 patients had skin graft as the preferred reconstructive method. 9 patients' reconstruction was made using a flap. There were five free flap reconstructions among these patients. Total LoH of the patients was 358 days (mean 6 days/patient). A total of 237 PPE including N95 masks and extra operation shirts were used (4,16/patient).

Treatment costs were calculated per group. None of the patients had any COVID-related complications after the operations. G1's mean treatment cost was $299.66 per patient (min. $14.33-max. $1,015.46). G2's mean treatment cost was $624.84 per patient (min. $66-max. $4,201). When disposable gown, sheet and COVID test expenses were excluded, mean cost (named as G3) became $539.84 (min. $1.82-max. $4063.02).

Chi-Square tests revealed insignificant differences of sex, age and treatment method distributions other than free flaps (e.g., wide excision, lymph node dissection, local flap, skin graft) between G1 and G2. Etiologies (G1 BCC 40%-G2 BCC 19.3%, G1 SCC 60%-G2 SCC 80.7%) showed statistically significant difference. (p=0.012) LoH values showed non-normal distribution on Shapiro-Wilk test. Therefore, Median values of G1 and G2, which are 2 and 3 days/patient, were compared with MWU test, which revealed significant difference between G1 and G2, indicating a longer LoH in G2. (p=.019) When free flaps in the G2 were considered as a major effector of longer LoHs and excluded from the analysis, the difference between the groups lost its significance and G1 LoH became slightly longer than G2. (p=.104) A similar examination was also held on costs.

Cost on both groups were tested for normality, and it was revealed that both had non-normal distribution. Therefore, MWU test was employed to compare medians of both groups' ($261,42 for G1 and $377 for G2), and a statistically significant difference was revealed. (p=.000) Free flaps were assumed to be one of the major contributors and a similar analysis was done without free flap patients. Median of G2 decreased to $357.50 and the difference remained statistically significant with MWU test. (p=.000) G1-G3 comparison was done with MWU test ($261,42 vs. $294,06) and it revealed insignificant difference. (p=.105)

DISCUSSION

With this study, we aimed to reveal if COVID-19 pandemic conditions affect the etiology, treatments and costs of H&N skin tumor surgeries. We found out that after the COVID countermeasures were introduced, an evident increase of costs came along.

When the COVID pandemic hit, threshold for interventions raised to assure less transfection of COV-SARS-2 virus between hospital microbiota and patients (2). Early suggestions for elective MF surgeries were suggested to be deferred such as orthognathic surgeries (4). Most centers strictly followed these rules, and only time sensitive treatments were done. However, besides medical, social and psychological ones,

there was also an economic impact of the pandemic. From macro to micro, all the parts of the economic systems of the world adapted to a “new normal” which necessitates a different income-expenditure balance, assuring older entries of expenditures to change (5). For this instance, as we examine in our study, patient-care costs of patients with any oncological surgery in H&N area have changed.

Skin, oral and pharyngeal cancers were categorized as to be operated immediately in the beginning of the pandemic (6). Before the pandemic out-break, we used to employ re-usable gowns and operation sheets suitable for sterilization. Naturally, precautions that we took for tumor patients were also taken for this group, always testing prior to surgery, using disposable material and using adequate PPEs as if we were operating a COVID (+) patient. In our algorithm, we prefer two preoperative PCR tests to minimize the risk of operating a COVID (+) patient, in whom stakes of postoperative pulmonary complications are higher. Moreover, it was suggested that when an asymptomatic patient was encountered, a high-risk of COVID transfection was possible in MF-area surgeries, due to close interaction with the oral-nasal area (7). We also believe that we minimize the surgical team’s exposure risk at the same time. We postponed any surgery of H&N area on a COVID (+) patient, if there is not a life-threatening clinical setting, that may have caused an extra burden by extended LoHs. All these factors may have raised the costs in this population.

Our statistical analysis showed an insignificant difference in LoHs. Even, G2’s LoHs (when free flaps are excluded) are opposed with a slight decrease. Moreover, our statistical analysis showed an insignificant difference between the groups if the additional expenses of post-COVID era such as disposable gowns and shirts, and COVID PCR tests were excluded.

Jayakar et al.’s study discussed costs of major H&N tumor treatments and concluded with $1.507,78 per patient. However, their study included laryngeal tumors and postoperative therapies also8. Differing from theirs, our study does not include postoperative treatments (8). In another study, Chen et al. discussed only skin tumors and concluded with a cost of $131,90 per patient. Free flap operations were not included in this study (9). Wissinger et al.’s study included free flap operations, with costs changing between $30,397 and $54,702 (10). In our study, there was only five free flap operations, of which all were in G2. The cost of our cases, which is one-tenth of the costs that are mentioned in the literature, can only be explained with regional and health system difference. Therefore, it is not possible to obtain a statistical result about the patients by comparing with the literature. From our country, there are not any studies discussing the costs of skin tumor treatment or free flap costs. Therefore, to be able to make a healthy comparison, we retrospectively reviewed similar patients for exact same length of time on pre-COVID setting. Failing to establish a healthy free flap comparison database, we achieved to obtain a database that can compare skin tumor treatment costs. At the same time, only five patients did not affect the study, and despite the higher costs and LoHs, G2 failed to show a significant difference from G1 on these aspects. Moreover, because we operated patients with H&N skin tumors in other clinics like Otolaryngology or Orthopedics before COVID, we failed to determine any free flap patients. Hence, it was shown not to affect our results with statistical analysis, when PPR costs were excluded.

As a limiting factor, our relatively small population may have limited our statistical power. Also, retrospective nature of the study design may have hindered the accuracy of our results. Future studies with a larger population and prospective design will state a clearer point. Moreover, a future study that examine numerous free flap patients’ costs that we operated in other clinics such as Otolaryngology Clinic in the post-COVID era may clarify another topic that is like ours. Nevertheless, this study is the first study that focuses on this topic from our country in our knowledge.

CONCLUSION

In the era of COVID, a way more cautious medical practice is a must. It is not a surprise that this meticulous behavior naturally causes a rise in expenses, but the question is how and why it happens. In this study, it was revealed that, although treatments are similar, COVID precautions add the additional burden to the cost of H&N skin tumor treatments. The PCR test has the largest impact on treatment costs.

Conflict of interest: The authors declare no conflict of interest.

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