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Effect of (SARS-CoV-2) pandemic on burn demography and experiences of burn physicians in the adaptation process

(SARS-CoV-2) Pandemisinin, yanık demografisi üzerine etkisi ve uyum sürecinde yanık hekimi deneyimleri

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SUMMARY

Objective: Starting in December 2019 in Wuhan, China, COVID-19 which was defined as a severe acute respiratory syndrome has become a global epidemic in a short period of time. Burn is a type of trauma during which the immune system is weakened due to changes in the leukocyte-lymphocyte distribution in the clinical presentation of blood, decreased chemotaxis and phagocytosis activity of granulocytes, decreased T cell activity and changes in their distribution, changes in humoral immune elements , and being susceptible to bacterial wound infections and is very common in all countries of the world.
We aimed to evaluate the effects of COVID 19 pandemic on burn patients demographically and to share our experiences on preventing COVID 19 infection which may be superposed to burn patients, and on preventing health workers and public health, and our new treatment algorithm with our colleagues from different nations.
Method: We statistically interpreted the effects of the new life process that entered our lives with applications such as curfew, closure of workplaces or slowing down work during the pandemic process aiming at controlling the infection on the differences in the demographic distribution of burn demography and its sociology by comparing the data of 3 consecutive years.
Results: While the data of the years did not show significance according to the months, a significant difference was found between the data of the previous 2 years and the data of 2020 between the gender, the types of burn and the time of first admission to the hospital.
Conclusions: We believe that the fact that all burn physicians are experiencing similar things on the international platform is going to enable us to create our algorithms in a short time for a common treatment and follow-up approach to burn patients during the pandemic.
Keywords: COVID-19, burn, demography, experience.

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ÖZET

Amaç: Aralık 2019'da Çin'in Wuhan şehrinde başlayarak, şiddetli akut solunum yolu sendromu koronavirüsü 2 (SARS-CoV-2) enfeksiyonu olarak tanımlanan (COVID-19) kısa bir süre içerisinde global bir salgın hâline gelmiştir. Yanık; kan tablosunda lökosit-lenfosit dağılımının değişmesi, granülositlerin kemotaksis ve fagositoz etkinliğinin azalması, T hücre

aktivitesinin azalması ve dağılımlarının değişmesi, humoral bağışıklık elemanlarının değişmesi, bakteriyel yara kaynaklı enfeksiyonlara açık olması nedeniyle, bağışıklık sisteminin zayıfladığı ve tüm dünya ülkelerinde oldukça sık görülen bir travma türüdür.
COVID 19 pandemisinin, yanık hastaları üzerine etkilerini demografik açıdan değerlendirmeyi ve yanık hastalarına süperpoze olabilecek COVID 19 enfeksiyonunu önleme, sağlık çalışanı ve toplum sağlığını korumaya yönelik deneyimlerimizi ve yeni tedavi algoritmamızı farklı uluslardan meslektaşlarımızla paylaşmayı amaçladık.
Yöntem: Pandemi sürecinde enfeksiyonun kontrol edilmesine yönelik getirilen sokağa çıkma kısıtlaması, iş yerlerinin kapatılması ya da iş yavaşlatılmaya gidilmesi gibi uygulamalar ile hayatımıza giren yeni yaşam sürecinin, yanık travması üzerinde demografik dağılım ve sosyolojik farklılıklarını ardışık 3 yılın verilerini kıyaslayarak istatistiksel olarak anlamlandırdık.
Bulgular: Yılların kendi içinde verileri aylara göre anlamlılık göstermezken, daha önceki 2 yılın verileri ile 2020 yılı verileri arasında cinsiyet, yanık oluşum şekilleri ve hastaneye ilk başvuru süreleri arasında anlamlı farklılık bulundu.
Sonuç: Uluslararası platformda tüm yanık hekimlerinin benzer şeyler yaşıyor olması, pandemi süresince yanık hastalarına ortak bir tedavi ve takip yaklaşımı için algoritmalarımızı, kısa sürede oluşturmamızı sağlayacağı kanısındayız.
Anahtar sözcükler: Burn, COVID-19, demografi, deneyim.

INTRODUCTION

COVID 19 was declared a global epidemic (pandemic) by the World Health Organization on March 11, 2020. The first case in our country was diagnosed on the same date. While some hospitals within the scope of COVID 19 were directly taken into the scope of COVID 19 hospital, some were left isolated and clean by providing an outpatient, inpatient, emergency and intensive care service. Some hospitals were switched to the mixed system, only COVID patients were admitted to the service and intensive care units, and in addition to COVID polyclinics, normal polyclinics and emergency services continued to be provided [1]. Although the burn units and burn centers were excluded from this system, since they had no isolated buildings and entrances, some changes were made within the hospital and they were engaged in the system. Given the immune suppression developing due to burns, especially in severe burns in burn patients, there is a high chance that Covid-19 can be superposed on their existing clinical presentation. Burn damage can affect all socioeconomic groups, people of all age groups. Even in the same country, differences in the factors causing burns are observed between regions. Regardless of the cause of the burn, the immune system is adversely affected. Despite advances in early treatment of burns, SIRS, sepsis and multiple organ failure are the major causes of morbidity and mortality in burn patients [2,3].

In line with these risks, serious burn patients are treated in burn centers that have physical conditions isolated from other patients, and burn intensive care units within the practices of our country, while lighter patients that need to be treated in hospital, are consulted in appropriate burn units using virtual communication networks created by burn doctors and they are monitored in isolated burn rooms and units of state hospitals [4]. The treatment of minor burn patients is continued in the nearest outpatient clinics in the form of daily applications. In our study, we summarized our efforts to keep burn patients out of the COVID pandemic while the burn units within the scope of state hospitals have every leading factor to make the burn so susceptible to infection, serious and fatal.

MATERIAL AND METHODS

Consent was obtained from the Martyr Prof. Dr. Ilhan Varank Sancaktepe Training and Research Hospital Clinical Ethics Committee for the retrospective analysis of the study (decision number: 2020/08). We compared the effects of the pandemic process on patients who admitted to the burn outpatient clinic at the same date ranges of 2018, 2019 and 2020. We compared burn patients admitted to our hospitals based on parameters such as clinical data of burn patients (Table 1), burn agent distribution (Table 2), burn place distribution (Table 3) and burn healing features (Table 4) according to years for the first 3 months of these years.

In the pandemic process, we evaluated the replacement treatment methods applied before admission to the hospital and the necessity of hospitalization in the real sense. We determined our treatment algorithm for burn patients in the pandemic process.

Statistics Package for Social Sciences (SPSS) for Windows®26.0 (IBM Corporation, Chicago, Illinois) software was used for data analysis.

Table 1: Clinical data of burn patients for the first 3 months of 2018 - 2019 -2020

	Number of patients	Female/Male Ratio	Mean age	Mean time to hospitalization (days)
2018	59	31/28	26,11	0,67
2019	48	24/24	27,50	0,35
2020	67	42/25	26,76	1,14

Table 2: Clinical data of all patients in Burn Agent Distribution According to Years .

	Number of patients	Scald burns	Chemical Agents	Fire	Contact	Electric
2018	59	35	8	8	2	6
2019	48	31	5	6	2	4
2020	67	30	17	10	6	4

Table 3: Clinical data of all patients in Burn Place Distribution According to Years .

	Number of patients	Home accident	Work accident
2018	59	47	11
2019	48	39	9
2020	67	64	3

Table 4: Clinical data of all patients in Burn Healing Features According to Years.

	Mean burn percentange	Dressing type (silver/moist)	Healing type (surgery/secondary)	Mean healing time (days)
2018	5,81	30/29	29/30	10,83
2019	5,41	15/33	14/34	8,85
2020	4,23	64/3	17/50	8,29

RESULTS

When the recovery time data is evaluated with the help of the Tamhane test by years, there is no significant difference between 2018 and 2019 (p value; $p = 0.235$), there is a significant difference between 2019 and 2020 (p value; $p = 0.012$), there is a significant difference between 2018 and 2020 (p value; $p = 0.030$) (Table 5). When the data of 3 months were compared within the groups, it was determined that the number of male / female patients decreased within each month (Table5).

The most common burns were caused by scalding as in the other two years and there was a decrease in flame and electrical burns (Table 6).

When evaluated in general, while the rate of work accidents decreased, there was an increase in home accidents and it was seen that women and child burns were statistically more in the group with home accidents (Table 7) .

When the data on the percentage of burns were evaluated with the help of the Bonferroni test by years, no significant difference was found between years (p values, respectively; $p = 0.804$, $p = 0.782$, $p = 0.738$) (Table 8).

Table 5: Statistical analysis of Clinical data of burn patients for the first 3 months of 2018 - 2019 -2020.

	Number of patients	Female/Male Ratio	Mean age	Mean time to hospitalization (days)
2018	59 (%25,106)	31/28	26,11 ± 7,15 (%95 GA: 25,87 – 27,04)	0,67 ± 0,35 (%95 GA: 0,41 – 0,87)
2019	48 (%20,425)	24/24	27,50 ± 5,45 (%95 GA: 26,65 – 28,25)	0,35 ± 0,15 (%95 GA: 0,17 – 0,77)
2020	67 (%28,510)	42/25	26,76 ± 6,88 (%95 GA: 26,05 – 27,10)	1,14 ± 0,47 (%95 GA: 0,82 – 1,28)

Table 6: Statistical analysis of Burn Agent Distribution According to Years.

	Number of patients	Scald burns	Chemical Agents	Fire	Contact	Electric
2018	59 (%25,106)	35 (%14,893)	8 (%3,404)	8 (%3,404)	2 (%0,851)	6 (%2,553)
2019	48 (%20,425)	31 (%13,191)	5 (%2,127)	6 (%2,553)	2 (%0,851)	4 (%1,702)
2020	67 (%28,510)	30 (%12,765)	17 (%7,234)	10 (%4,255)	6 (%2,553)	4 (%1,702)

Table 7: Statistical analysis of Burn Place Distribution According to Years.

	Number of patients	Home accident	Work accident
2018	59 (%25,106)	47 (%20)	11 (%4,680)
2019	48 (%20,425)	39 (%16,595)	9 (%3,829)
2020	67 (%28,510)	64 (%27,234)	3 (%1,276)

Table 8: Statistical analysis of Burn Healing Features According to Years.

	Mean burn percentange	Dressing type (silver/moist)	Healing type (surgery/secondary)	Mean healing time (days)
2018	5,81 ± 1,54 (%95 GA: 5,27 – 6,04)	30/29	29/30	10,83 ± 3,15 (%95 GA: 9,87 – 11,54)
2019	5,41 ± 1,10 (%95 GA: 4,89 – 6,10)	15/33	14/34	8,85 ± 2,67 (%95 GA: 8,05 – 9,37)
2020	4,23 ± 1,05 (%95 GA: 3,97 – 4,95)	64/3	17/50	8,29 ± 2,14 (%95 GA: 7,95 – 8,97)

DISCUSSION

Coronavirus 2019 disease, which is declared as a pandemic in the whole world, is a respiratory system disease transmitted by droplets. Corona virus infection is even more dangerous in burn patients as the immune system is impaired by various mechanisms. In burn patients, a hyper-inflammatory response occurs primarily in response to trauma, followed by a significant increase in TNF-α, IL-6, IL-1β, and IL-8 levels. As a result, fever, acute phase reactant production and T cell activation, increased Th1- / Th2 distribution and macrophage activation develop [3]. The anti-inflammatory response which develops to suppress this hyper-inflammatory response causes immunosuppression. Burn patients have increased levels of GH, vasopressin, cortisol, aldosterone, glucagon and catecholamine, which we know as stress hormones. With the effects of these hormones, increase in Th2 production rate, decrease in the level of pro-inflammatory cytokines, increase in PGE2 level and suppression of lymphocyte production, increase in T suppressor cell activation are observed. The increase in the release of anti-inflammatory cytokines, especially IL-4 and IL-10, disrupts the innate immune system's response to pathogens by disrupting the activity of NK cells, neutrophils and macrophages. Immunosuppression that occurs in burn patients with these mechanisms makes these patients prone to opportunistic infections and death.

In the pandemic process, we had to revise the treatment of patients who admitted to our burn clinics, indications for burn services, burn patient transfer, types of treatment applied to patients who were hospitalized, burn surgeries, duration of hospitalization, post-discharge follow-up, rehabilitation plans [5,6]. We took medical stories of patients who applied to our burn outpatient clinics about their burn and Covid infection. In order to evaluate the burn, we learned when and how the burn occurred, the time that passed until it came to us, and the methods they used. In order to evaluate the Covid risk, we questioned fever, cough, weakness, muscle pain, abdominal pain, diarrhea, existence of a history of traveling abroad in the past 14 days, and the presence of a person with a diagnosis of Covid in the surrounding [5,7]. While examining the patients, we wore disposable gowns and gloves to protect each patient against potential disease and to prevent transmission to healthcare personnel. In line with the Ministry of Health Covid prevention directive, we used glasses and a medical mask [8] .

It was learned that the patients were hesitant to come to the health institutions due to the pandemic and made their first treatments with more traditional methods they knew at home. The home treatments included hydrotherapy, olive oil and centaury oil, and other forms of local treatment learned in the community, as evidenced by their anamnesis [9]. After the closure of the schools of the students studying in different cities, they returned to their family homes in the country, the elderly who were in nursing homes returned to their children for better care, and this led us to the conclusion that the area per person in the houses decreased, the small living areas were compromised, which caused an increase in home accidents. We evaluated in detail the burns due to home accidents, which we thought were developed due to people staying at home. Scald burns were most common in cases reported as home accidents . Causes of scald are often hot water and tea. In addition, it was observed that there was an increase

in head, neck and upper extremity burns that occurred after careless opening of pressure cookers used for cooking at home. The pandemic changed the lifestyle not only in the city centers of big cities but also in rural areas and villages around the city. It was observed that the children who spent time outside in the previous period when their mothers were doing household chores stayed at home and this caused deep scalding burns in children as a result of accidents such as falling into boiled milk for making cheese and yoghurt in large cauldrons. Since this type of viscous burns are more difficult to heal than hot water burns, patients were found to have longer hospitalizations and higher infection rates. Among the reasons that increased contact burns was again the increase in the number of people who stayed in the house and due to this occurrence of burns with household appliances such as pots, pans and irons. As a result of the lockdown and people's efforts to produce more hygienic bread, bread was started to be baked at home ovens in big cities. This can be considered among the causes of increased contact burns. This rate also increased when children at home carried street games that they normally play outside into the house, ran inside the house in restricted areas, and when their curiosities and instincts to imitate elders, learning and efforts to get involved was also added on top of these . It was observed that there was a relative decrease in the number of flash-burns which are in the first place among the causes of burns. We think that the closure of industries, restaurants, night clubs is effective in reducing flash-burns in this process. Burn cases due to work accidents which are expected to be more common under normal conditions, especially in young and male patients, were observed to be decreased. Publications were made in the media, which included the increased risk of catching Covid infections and their increased risk of severity in smokers. We think that these publications reduced people's smoking in this process and the risk of accidents that may occur due to smoking. Exceptionally, we received 5 patients who were unconscious after taking drugs at home and who were injured as a result of the burning of the cigarette in their hands, especially with deep burns of more than 40% flash burns in the 2nd and 3rd degrees in the body. In addition, there was an increase in fires in old houses with poor physical conditions and plumbing systems, and flash-burns due to open cookers and floor furnaces used in rural areas . Stoves used as a result of decreased temperatures and fireplace-like heaters used for heating were observed as causing an increase in flash-burns in the elderly and children in the home. As a result of polyneuropathy in the elderly, especially due to additional diseases such as DM, an increase in the number of both contact and flash-burns due to heat sources was observed. In these patients with additional diseases, burns with long recovery time, high infection rates, and problems in follow-up and treatment during the pandemic process were encountered . There was an increase in the chemical burns of children and women, which occurred due to solvents and purifying agents used in house cleaning .The closure of hairdressers during this process caused 2nd degree chemical burns on the scalp of two female patients who tried to dye their own hair at home as they could not adjust the amount of decolorizers they used. Another rather dangerous cause of burns, although they are more rare than others, were electrical burns in the form of hand and mouth burns, which were caused by electric devices, sockets and cables that they did not notice before at home in order to discover and attract the attention of elders .

While patients we followed at the outpatient clinic in 2018 and 2019 were being followed up with moist dressings every other day, we changed the type of moist dressings we recommended to ensure that the patients were less likely to come to the hospital during the pandemic process, and started to follow the patients with silver dressing suggestions [10,11]. By supplementing all patients orally as outpatients, we tried to benefit from the antioxidant effect of zinc [10]. The development of contractures and limited motion in the joints is a major problem for burn patients in the future. Physical therapy exercises started in the early period have a great role in preventing these problems that will develop in the future. In the pandemic process, mass patient exercise programs could not be organized in physical therapy units, so physiotherapists, patients or their parents were trained in physiotherapy for their home practice even in their first sessions.

In this process, medical treatments were arranged weekly to prevent disruption of their treatment. Fever is a common symptom in burn patients. In order not to overlook the fever due to the superposed Covid infection, we evaluated in detail whether patients with fever had weakness and cough complaints accompanying the fever. Considering that the burn patients are reported to be sensitive to virus diseases in the literature, different algorithms have been introduced even in the making of periodic influenza vaccines to burn patients [12].

Nasopharyngeal and oral swabs were taken from patients with fever, and thorax CT was performed in patients with clinical suspicion of Covid. In

order to prevent superposition in patients with fever and to avoid suspicion for COVID 19 infection, we started empirical antibiotherapy after taking cultures for burn infection factors from patients who were excluded from Covid infection as a result of examinations and followed up the patients. It was started in the form of a zinc oral tablet or suspension with epithelizing action, which has been shown to be effective in accelerating wound healing in animal experiments and clinical trials. Thus, we wanted to benefit from the synergistic effect of silver products with zinc, which reduces the risk of infection and increases the rate of recovery [11]. Hospital administrations also made changes in the physical conditions and work of the burn centers. Only one entrance door was started to be used to make the entrance to the burn centers more controlled. In the previous period, companions were allowed for burn patients. However, if the entrance and exit to the hospital and the number of people in the hospital increased, it was forbidden to take companions for adult patients, with the risk of Covid infection, which could increase the risk of the burn patient, the companion, the people who will be communicating outside the hospital and the healthcare personnel. For the COVID 19 outbreak, as part of extraordinary measures no patient was admitted by shutting down hydrotherapy tanks [1]. Instead of applying the hospitalization criteria we used for patients whom we think should be hospitalized, we switched to methods where we can keep patient hospitalization more limited . For example, we used Laser-assisted Indocyanine Green Fluorescence (ICG) angiography method when deciding the patient's hospitalization in severe limb burns . There are studies in the literature that show ICG Angiography helps the surgeon to determine whether the debridement will be made on the surface or deeper or whether simultaneous grafting can be performed by determining the ischemic zone and perfusion in the burn [13].

Burn depth must be determined early in order to use the most appropriate treatment method. Studies show that Laser fluorescence angiography examination showing the amount of blood supply is more valuable than burn depth estimation made by physical examination [13]. We followed up patients, whom we think may be suitable for outpatient treatment at the outpatient clinic using silver wound care products [11]. We hospitalized the patients with deep burns, poor blood supply and bad tissue, and we performed early tangential excision and simultaneous grafting . Early excision and grafting, hospitalization time, wound healing time, risk of infection, long-term contracture is considered appropriate today to minimize the risk. While patients with a need for debridement were done with a daily hospitalization, pediatric patients were hospitalized for only 1 day.

While performing the debridement, dermatome blades were used, predicting the risk that hydrosurgical systems might spread the infection with aerosol. Subsequently, it was continued with creams that made enzymatic debridement [14]. Patients who were planned to have a graft and flap operation were again consulted with virtual networks and all preop procedures were completed and referred to clean burn hospitals for operation [2]. Recovery times were evaluated according to the degree of burns. With the new regulations in the pandemic process, we believe that the burn recovery time, in accordance with the literature data, has not been increased, the cost of hospitalization has decreased despite the increase in dressing costs, and the risk of both patients, people accompanying them and medical personnel getting Covid 19 infection has not increased due to patients not coming to hospitals, instead staying at home [9,15].

Among the limitations of the study, the foremost were elderly people who opposed home-based treatments and persistently wanted to apply old-fashioned methods. In contrast, verbal reminders were frequent. A limit to this study is the diversity of the cases included. Definitive conclusions on the matter are not possible. As large studies with high quality and multicentral datas are needed.Multi-center studies are required within the Ministry of Health for changes in burn treatment algorithm and burn service standards.

We have given detailed information to our patients and their relatives that post-discharge home visits, which are part of our cultural values, and condolence visits for our decedent patients are absolutely wrong. We explained that the protection method is the primary method, even the places of worship were closed to collective worship all over the world in this process, the priority measures that they should take as individuals, and the 14-day rule [14]. "14 days of medical observation" rule should never be forgotten. Burn staff with a contact story should leave the team and their contact with other patients and medical staff should be discontinued. The follow-up and prevention of this infection in the burn unit is more vital than other clinics. Additionally, we informed that home accidents are foreseeable and preventable accidents, that feeling restricted, living with a mask all day, and unknowns are causing stress to everyone but as a result of this they could cause other problems.

CONCLUSION

As a result, when the burn is combined with Covid 19, it will be very fast to go to the fatal picture and septic shock, so as far as possible, the patient units, admission criteria and new treatment algorithm should be created in the burn units in line with social differences. At this stage, the meeting of the patient and the doctor and the treatment can be aided with virtual networks and programs that may be installed on the people's phone, perhaps through the Internet.

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