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ORIGINAL ARTICLE

Impact of the 2020 French lockdown due to the SARS-CoV-2 pandemic on emergency consultations for pediatric burns in a regional referral hospital

Impact du confinement total de 2020 en France dû à la pandémie de SARS-CoV-2 sur les consultations de brûlés pédiatriques dans un hôpital référent régional

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Burns;
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Summary
Introduction. — SARS-CoV-2 pandemic required the establishment of total lockdown in France from March 17 to May 11, 2020. We analyzed the impact of this lockdown on the pediatric burn population consulting in our burn unit during this period compared to data from previous years in order to analyze our model of emergency care for children burned during this unprecedented situation.
Material and methods. — We carried out a retrospective single-center study by reviewing files concerning emergency consultations for children burns during the total lockdown in France in 2020 (COVID group) compared to the same weeks of 2018 and 2019 (no-COVID group).
Results. — We find a significant decrease in the number of consultations ($P = 0.02$) during the confinement period. In the ''COVID'' group, we found a significant increase in burn to the hand ($P = 0.03$) and lower limbs ($P = 0.03$). The other criteria evaluated did not find any difference between the groups. Assessment of a possible rebound effect within 2 weeks of total lockdown found an increased incidence of the children burn consultation, an increased number of older

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children and mainly male.
Conclusion. — The decrease in the number of consultations alerts us to a potential increase in the functional sequelae of burns in these patients at risk. Longer-term follow-up will allow us to assess the consequences of this lockdown on this particularly at-risk population.

MOTS CLÉS
Brûlures ;
Enfants ;
Confinement ;
SARS-CoV-2 ;
Covid

Résumé
Introduction. — La pandémie de SARS-CoV-2, a nécessité la mise en place d'un confinement total en France du 17 mars au 11 mai 2020. Nous avons analysé l'impact de ce confinement sur la population brûlée pédiatrique consultant dans notre centre de traitement des brûlés lors de cette période par rapport aux données des années précédentes afin d'analyser notre modèle de prise en charge en urgence des enfants brûlés lors de cette situation inédite.
Matériel et méthodes. — Nous avons réalisé une étude monocentrique rétrospective par revue de dossiers concernant les consultations en urgence pour brûlure chez les enfants durant la période de confinement total en France en 2020 (groupe COVID) par rapport aux mêmes semaines de 2018 et 2019 (groupe non-COVID).
Résultats. — Nous retrouvons une diminution significative du nombre de consultations ($p = 0,02$) lors de la période de confinement. Dans le groupe ''COVID'', nous avons retrouvé une augmentation significative des atteintes de la main ($p = 0,03$) et des membres inférieurs ($p = 0,03$). Les autres critères évalués ne retrouvaient pas de différence entre les groupes. L'évaluation d'un éventuel effet rebond dans les 2 semaines qui ont suivi le confinement total retrouvait une augmentation de l'incidence dans le groupe « non-COVID », des enfants plus âgés et principalement masculin.
Conclusion. — La diminution du nombre de consultations nous alerte quant à une potentielle majoration des séquelles fonctionnelles de brûlures chez ces patients à risque. Un suivi à plus long terme nous permettra d'évaluer les conséquences de ce confinement sur cette population particulièrement à risque.

Introduction

Burns are among the most frequent accidental injuries in children, specifically before 4 years old, representing 28.8% of pediatric hospitalizations in France [1]. The SARS-CoV-2 pandemic, which began in November 2019 in China and spread throughout the world, required the establishment of a total lockdown in France from March 17 to May 11, 2020. This public health decision, taken to stem the spread of the virus, had forced millions of children into their homes by closing schools and various childcare facilities.

We analyzed the impact of this lockdown on the pediatric burn population consulting in our burn unit during this period. We compared to data from previous years in order to analyze our model of emergency care for children burned during this unprecedented situation.

Material and methods

We carried out a retrospective single-center study by reviewing files concerning emergency consultations for burns in children. We queried our computer database containing the list of consultations for burns in children between March 17 and May 11, 2020 (eight weeks) corresponding to the time of total lockdown in France due to the SARS-CoV-2 pandemic. This lockdown imposed the closure of schools, nurseries and other means of childcare. The children were completely confined to their homes without a walking permit within a radius of one kilometer. Our main objective was to compare these data (COVID group) to the same period during 2019 and 2018 (no-COVID group). We hypothesized that this lockdown was responsible for a decrease in the number of consultations, an increased time between the burn and the consultation and also between the accident and a possible surgery (split thickness skin graft) potentially responsible for delayed treatment with an increased risk of sequelae.

The various data reported were as follows: number of consultations in our center for pediatric burns (< 15 years and 3 months), age at the time of the consultation, sex, burn localisation, total burn surface area (% TBSA), burn degree, burn cause as well as the time between accident and the consultation, need for hospitalization, skin graft surgery, time between the accident and skin graft and finally the total hospital stay.

Statistical analysis was performed using BiostaTGV software (Pierre Louis Institute of Epidemiology and Public Health, UMRS 1136, Paris, France). Chi 2 and Kruskal-Wallis tests were performed according to the nature of the variables evaluated.

Results

In all, 31 consultations for burns in children were carried out during the total lockdown period of 2020 (''COVID'' group) versus 100 (''no-COVID'' group). The different demographic data are presented in Table 1.

Table 1 Demographic data.

	Covid	NO-Covid
Medical consultation (number)	31	100
Mean age (years)	4.55 [16m—15y]	4.03 [4m—15y]
Sex		
Male	14 (45.2%)	63 (63%)
Female	17 (54.8%)	37 (37%)

The number of consultations was compared as incidences, we were able to establish the number of children in our activity area at 1,300,000 children (< 15 years and 3 months). In the ''COVID'' group, we found an incidence of 13.6 consultations per 100,000 children/year and 22 in the ''non-COVID'' group. We also found a significant lower number of consultations ($P = 0.02$) during the total lockdown. According to the age of the patients, the trend does not seem to be different. But according to the sex, there are fewer boys in the ''no-COVID'' group.

Data on the burns localisation, the affected skin area, the depth of the lesions and their mechanism are presented in Table 2.

In the ''COVID'' group, we found a significant increase in attacks on the hand (excluding the palm) ($P = 0.03$) and the lower limbs ($P = 0.03$).

Analysis of the other burn localisations, total burn surface area (% TBSA), burn degree and burn cause do not show any significant difference between the two groups.

We present in Table 3 the data concerning time between the burn and the consultation, hospitalizations following the burn, need for split thickness skin graft, time between the burn and the surgery and finally the total hospital stay when it occurs.

Median days between the occurrence of the burn and the appointment was 5 days in the ''COVID'' group and 7 days in the ''no-COVID'' group without significant difference ($P = 0.15$). Regarding the hospitalization rate, it was 19.4% ($n = 6$) in 2020 and 19% ($n = 19$) in 2019 and 2018. Split thickness skin grafts performed on these patients were 19.4% ($n = 6$) and therefore 100% of hospitalized patients in the COVID group against 12% (and therefore 63% of hospitalized patients) in the ''no-COVID'' group. On this data, the trends did not appear to be different. Likewise for the hospital stay, 3.3 days against 8.25 respectively in 2020 and 2018—2019. As well as for the time between the accident and the realization of a skin graft: respectively 12 days and 15.25 days on average. There was no difference in the statistical analyzes, the data differs due to the extreme values which skewed the averages.

Table 3 Care data.

	Covid	No-Covid	
B to cs (days, median)	5 [1—14]	7 [0—38]	$P = 0.15$
Hospitalisation (number)	6 (19.4%)	19 (19%)	
STSG (number)	6 (19.4%)	12 (12%)	
B to STSG (days)	12 [10—14]	15.25 [13—23]	
Hospital stay (days)	3.3 [1—10]	8.25 [1—24]	

B to cs: median days between burn and consultation; STSG: split thickness skin graft; B to STSG: median days between burn and STSG.

We also reviewed the files for the two weeks following total lockdown. The main trends emerging from the data analysis are an increased incidence of 30.4 consultations per 100,000 children/year compared to 13.6 in the ''non-COVID'' group, older children (8.5 y vs. 4.55 y) and mainly male (80% vs. 42%). There was no increase in the total burnt area (1.9 vs. 1.8% TBSA), hospitalization or skin grafting rate (Table 4).

Table 2 Burns data (bold: burn location, italic: surface burn area, bold & italics: depth of burn, underline: burn etiology).

	Covid	No-Covid	
Palm of the hand (number)	4 (10.8%)	37 (37%)	
Hand (no palm)	*9 (24.4%)*	*12 (12%)*	*P = 0.03*
Thorax	5 (13.5%)	13 (13%)	
Face	*2 (5.4%)*	*8 (8%)*	
Superior limb	5 (13.5%)	21 (21%)	
Lower limb	*12 (32.4%)*	*23 (23%)*	*P = 0.03*
External genitalia	0 (0%)	1 (1%)	
Mean burn surface (% total body surface area)	*1.81 [1—7]*	*1.71 [1—8]*	
1st degree (number)	3 (9.1%)	2 (2%)	
2nd superficial degree	*18 (54.5%)*	*77 (77%)*	
2nd deep degree	8 (24.2%)	24 (24%)	
3rd degree	*4 (12.2%)*	*1 (1%)*	
Liquid (number)	14 (45.2%)	46 (46%)	
Fire	*2 (6.5%)*	*7 (7%)*	
Thermal contact	15 (48.4%)	47 (47%)	
Chemical	*0 (0%)*	*0 (0%)*	
Electric	0 (0%)	0 (0%)	

Table 4 Data Covid (8 weeks of SARS-CoV-2 lockdown) and 2 weeks after SARS-CoV-2 lockdown.

	Covid	2w after Covid
Medical consultation (number)	31	15
Mean age (years)	4.55 [16m—15y]	8.5 [1.5—11y]
Sex		
Male	14 (45.2%)	12 (80%)
Female	17 (54.8%)	37 (30%)
Palm of the hand (number)	4 (10.8%)	0
Hand (no palm)	9 (24.4%)	4 (26%)
Thorax	5 (13.5%)	4 (26%)
Face	2 (5.4%)	3 (20%)
Superior limb	5 (13.5%)	5 (33%)
Lower limb	12 (32.4%)	3 (20%)
External genitalia	0 (0%)	0 (0%)
Mean burn surface (% total body surface area)	1.81 [1—7]	1.93 (1—4)
1st degree (number)	3 (9.1%)	0 (0%)
2nd superficial degree	18 (54.5%)	12 (80%)
2nd deep degree	8 (24.2%)	2 (13%)
3rd degree	4 (12.2%)	1 (7%)
Liquid (number)	14 (45.2%)	11 (73%)
Fire	2 (6.5%)	0 (0%)
Thermal contact	15 (48.4%)	3 (20%)
Chemical	0 (0%)	1 (7%)
Electric	0 (0%)	0 (0%)
B to cs (days, median)	5 [1—14]	6 [3—14]
Hospitalisation (number)	6 (19.4%)	4 (26%)
STSG (number)	6 (19.4%)	4 (26%)
B to STSG (days)	12 [10—14]	14.5 [13—17]
Hospital stay (days)	3.3 [1—10]	5 [13—7]

Discussion

The occurrence of the SARS-CoV-2 pandemic since the end of 2019 has led to an unprecedented total lockdown in France for eight weeks. Keeping parents and children at home as well as the reorganization of hospitals (closure of care units, instructions not to overload emergencies) have changed patient habits. Our study remains original because it studies the impact of the 2020 lockdown over the same period of the two previous years and for the two weeks after the end of the lockdown, which has never been done before specifically about SARS-CoV-2 pandemic.

Indeed, compared to the two previous years (2019 and 2018), Rougereau and al. [2] found a significant decrease in emergency room visits ($P < 0.0001$) for traumatology (fracture, traumatic wound, spain/bruise contusion) except for burns. Charvillat and al. [3] conducted a retrospective study comparing data from children burned during general lockdown with data from the previous five years. They report an increased number of pediatric burns during lockdown, attributing it to home stay and the occurrence of domestic accidents. Conversely, we statistically observed less consultation for burns during lockdown in our study. Home stay of parents or family referents could allow increased children overseing and greater prevention in our population. In addition, Charvillat and al. [3] report a majority of burns by boiling water, which is not found in our study (scalding and thermal contact seems equivalent in the two groups). They found a median age of 18 months, lower than ours data (about 4 years) and a predominance of lower limbs burns which we also find. In the same way, they do not find an increased take-over time.

Chara and al. [4] did not compare the lockdown consequences but globally SARS-CoV-2 by analyzing data from pediatric burn patients from 2020 to the previous four years. The demographic and burn data did not differ, and the authors also did not find a difference in take-over time and follow-up before and after SARS-CoV-2.

Sethuraman and al. [5] report a obvious decrease in emergency room visits in their unit in the USA. As well as specialized consultations contrasting with the increase in intensive care hospitalizations and the proportion of children with a total burn area $>$ 5% compared to the last year. No age difference between the periods studied (around 4 years like our study), severity of burns is greater according to the surface area affected, proportion of children burned $>$ 5% TBSA and intensive care admissions.

As in our study, Tatar et al. [6] in Romania, observed a decrease in the number of consultations during lockdown but no significant decrease in the rate of skin grafts. They did not study the time between burn and medical care.

Conversely, Demircan and al. [7] reported increased admission and hospitalization rates during lockdown in Turkey, as well as %TBSA in hospitalized patients (49% to 66% TBSA during the pandemic).

Mann and al. [8], assessed the impact of school closures on childrens burn admissions to the emergency room at Leicester Hospital. They report the fact that during lockdown and

despite the preparation of meals at home and the attraction of baking, number of child burns decreased in all age groups except between 6 and 10 years. There were also no proportionately more food-related burns during this period.

D'Asta and al. [9] also analyzed the lockdown impact on the epidemiology of pediatric burns at Birmingham Hospital UK. Despite 60% fewer emergency room visits, the incidence of pediatric burns was proportionately higher (2.8% of emergency room visits compared to 1.5% the previous year). This was probably linked to the closure of facility appeal services (pharmacy, general practitioner).

In the study by Brewster et al. [10], gender distribution was similar, but the mean age of patients with burns increased from 2.9 to 4.8 years and more patients were admitted with burns surface involved more important, which does not transpose with our observations. Burns from boiling water remain the most common cause of pediatric burns (85% during confinement, 68% during control).

Their center observed an upsurge in burns caused directly by the practice of steam inhalation during the COVID-19 pandemic, as a non-prescribed method to prevent and treat respiratory symptoms related to the virus. This method was also described in the publication of Brewster et al. [10] with a 30-fold increase in the number of burns resulting directly from accidents caused by vapor inhalation. We did not observe this practice in our study ($n = 0$).

Yaacobi et al. [11] in Israel showed that time between burn and emergency room visit was longer associated with an increase in hospitalization (4.5% versus 2 to 2.6%) during lockdown. However, the length of stay was similar to routine, the rate of surgery was similar to the previous years, and the length of follow-up to recovery, defined as discontinuation of nursing, was similar; these observations were also found in our study.

Pelizzo et al. [12] described that the management of pediatric burn patients in a referral hospital during the SARS COV-2 epidemic should be recognized as safe and feasible, without additional risk of infection or major sequelae. A rigorously planned service, involving a multidisciplinary team to guarantee patients and parents' well-being as well as the good application of exceptional sanitary measures in their center for severe burns have enabled the treatment and long-term care of pediatric burns.

They showed a higher admission rate compared to previous years (52 vs. 32 admissions) but did not mention emergency appointments. For our part, we have not noticed a decrease in hospitalizations.

We also evaluated the two weeks following the end of the total lockdown to look for a possible ''rebound effect'' that could have been caused by this lockdown. Two main informations stand out: increased incidence of consultations as well as a difference in the pediatric population: older and more male. These two observations open us to a new thought on increased vigilance on this population during deconfinements. However, these data, should be compared with those of other major burn centers to verify or not our observation and therefore justify or not appropriate prevention measures.

Conclusion

The decrease in the number of consultations for pediatric burns during 2020 lockdown alerts us to a potential increase in the functional sequelae of burns in these at-risk patients.

We have demonstrated a significant modification of the usual locations of burns but this without any difference according to the burn degree, burn cause or total burn surface area compared to the previous years. Take-over time, hospitalization length, surgery rate and hospitalizations were not different from 2019 and 2018. Longer-term follow-up will allow us to establish conclusions in terms of sequelae on this particularly at-risk population.

Disclosure of interest

The authors declare that they have no competing interest.

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