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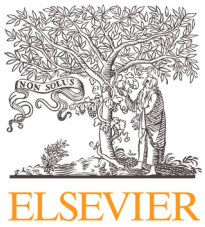

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The impact of COVID-19 on plastic and reconstructive surgery in China: A single-centre retrospective study☆

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KEYWORDS
Coronavirus disease 2019;
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Summary *Background:* This study aimed to investigate the volume of plastic surgery operations in a large public hospital and figure out the changes in the related factors associated with Coronavirus Disease 2019 (COVID-19) and identify the potential problems.
Methods: We created a survey and collected clinical data from 1 January 2018 to 31 December 2020. Information on procedure time, patient gender, patient age, and procedure type was collected from the database. The data were analysed using IBM SPSS Statistics for Windows, version 25.0.
Results: A total of 10,827 patients were admitted to our department. The total number of patients decreased by 21.53% in 2020 (3057 cases) than the same period in 2019 (3896 cases). The total number of aesthetic procedures decreased by 34.17% in 2020 than that in 2019. However, restorative procedures in 2020 (2013 cases) only decreased by 12.86% than that in 2019 (2310 cases). The percentages of women amongst patients who underwent aesthetic procedures were 91.75%, 92.18%, and 90.71% in 2018, 2019, and 2020, respectively. Most of the patients in these three years were aged 20–29 years.
Conclusions: The plastic surgery industry is experiencing the effects of the unprecedented COVID-19 pandemic worldwide. COVID-19 was quickly brought under control, and the plastic

☆ Zhihua Qiao and Yiwen Deng contributed equally and share the first authorship. Xiancheng Wang conceived of and designed this study. This article was written by Zhihua Qiao and Yiwen Deng, and Xiancheng Wang and Borong Fang were responsible for revising this article. Yang Sun and Xiang Xiong were responsible for the collection of data. Xianxi Meng and Wenbo Li were responsible for completing the pictures and tables. Zhongjie Yi and Xiaofang Li were responsible for supervising data collection and analysis.

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surgery industry developed rapidly in China because of the active, timely, and accurate implementation of epidemic prevention strategies.

Introduction

The Coronavirus Disease 2019 (COVID-19) pandemic, a severe contagious disease[1] that rapidly spread worldwide, infected more than 246 million people, and led to more than 5 million deaths, is likely to continue to impose enormous burdens, amongst which are severe disruptions of societies and economies. Large-scale clinical data suggest that social and economic pressure,[2] public health system,[3] and physical and psychological complications[4] have been explicitly described.

Plastic and reconstructive surgery is a separate branch on the tree of general surgery.[5] As Staige described, plastic surgery focuses on the repair of defects and malformations, improvement in appearance, and restoration of function.[6] Based on the particularity of this subject, public demand for plastic surgery, particularly cosmetic surgery, has been in serious decline during the pandemic.[7]

Most studies have focused on prevention strategies for plastic surgery during the pandemic.[8] Clinical studies on the impact of the COVID-19 pandemic on plastic surgery are urgently required. However, few studies have combined online surveys to indirectly assess the impact of COVID-19 on plastic surgery.[9] Thus, the severity and characteristics of the impact of the pandemic on plastic surgery in public hospitals in China remain unknown.

Furthermore, no studies have yet reported the impact of COVID-19 on plastic surgery in China using quantitative indicators to reveal trends in disciplines amidst the pandemic. We investigated the volume of plastic surgery operations in a large public hospital and determined the changes in factors associated with COVID-19 during the last three years to identify the potential problems.

Patients and methods

To better assess the impact of the COVID-19 pandemic on plastic surgery and propose ways to address the existing challenges, we created a survey based on the medical record system of the Department of Plastic and Aesthetic (Burn) Surgery. Data analysis was performed from 1 January 2018 to 31 December 2020. The study protocol was approved by the institutional review board of the Second Xiangya Hospital of Central South University.

The collected clinical data included four base items: procedure time, patient gender, patient age, and procedure type. The types of procedures included burns, acute wound repair, chronic wound repair, benign surface masses, malignant surface tumour, congenital malformations, scar excision, rhinoplasty, blepharoplasty, mammoplasty, botulinum toxin injection, vaginal rejuvenation, and axillary osmidrosis surgery (Table 1). Patient names, detailed addresses, record numbers, and any other individually identifying information were not collected or entered into the database.

The data were analysed using IBM SPSS Statistics for Windows, version 25.0. Measurement data with a normal distribution and homogeneity of variance were expressed as means ± standard deviation and compared using one-way analysis of variance. Measurement data that were not normally distributed or without uniform variance were expressed as M(QR) and compared using Kruskal–Wallis H test. For enumeration data, Pearson chi-square tests were performed when all theoretical numbers (T) were $\geq$5 and the total sample size n were$\geq$40. Statistical significance was set at $p< 0.05$.

Results

The total volume of procedures performed in the plastic surgery was significantly lower than that before the pandemic

A total of 10,827 patients were admitted to the Department of Plastic and Aesthetic (Burn) Surgery for treatment between 1 January 2018 and 31 December 2020, including 3874 in 2018, 3896 in 2019, and 3057 in 2020, showing a decrease of 21.53% than the same period in 2019. Because the monthly average number of patients in this study did not show a normal distribution, Kruskal–Wallis H test was performed to identify the differences between the monthly average numbers of patients for the three years. The results showed no significant differences between the monthly average number of patients in 2018 and 2019, but a significantly different number of patients in 2020 than both 2018 ($p = 0.046$) and 2019 ($p = 0.016$). The lowest number of patients was admitted to the clinic in February 2020 (Figure 1). The volume of patients admitted to our department decreased significantly from an average of 325 new admissions per month in 2019 to 19 admissions in February 2020, corresponding to the COVID-19 outbreak in China. Of the 19 admissions, 16 (84.21%) patients were admitted from the emergency department for head and facial trauma. As shown in Figure 1, July 2018, January 2019, and July 2019 showed small peak numbers of patients admitted to the Department of Plastic and Aesthetic (Burn) Surgery.

The total volume of aesthetic procedures performed in the plastic surgery was significantly lower than that before the pandemic

The items were divided into restorative and aesthetic procedures. Restorative procedures included burns, acute wound repair, chronic wound repair, benign surface masses,

Table 1 Demographic and clinical features before and during the COVID-19 outbreak.

	2018 no. (%)	2019 no. (%)	2020 no. (%)	Percent change 2019 vs. 2018 (%)	Percent change 2020 vs. 2018 (%)
Total number	3874 (100)	3896 (100)	3057 (100)	0.56	−21.08
Month					
January	323 (8.3)	374 (9.6)	287 (9.4)	15.79	−11.15
February	266 (6.9)	294 (7.5)	19 (0.6)	10.53	−92.86
March	309 (8.0)	323 (8.3)	150 (4.9)	4.53	−51.46
April	284 (7.3)	345 (8.9)	252 (8.2)	21.48	−11.27
May	306 (7.9)	331 (8.5)	247 (8.1)	8.17	−19.28
June	313 (8.1)	341 (8.8)	277 (9.1)	8.95	−11.50
July	433 (11.2)	396 (10.2)	330 (10.8)	−8.55	−23.79
August	369 (9.5)	316 (8.1)	326 (10.7)	−14.36	−11.65
September	321 (8.3)	286 (7.3)	279 (9.1)	−10.90	−13.08
October	326 (8.4)	287 (7.4)	297 (9.7)	−11.96	−8.90
November	311 (8.0)	300 (7.7)	311 (10.2)	−3.54	0.00
December	313 (8.1)	303 (7.8)	282 (9.2)	−3.19	−9.90
Procedure type					
Blepharoplasty	476 (12.3)	574 (14.7)	345 (11.3)	20.59	−27.52
Botulinum toxin injection	450 (11.6)	432 (11.1)	328 (10.7)	−4.00	−27.11
Rhinoplasty	279 (7.2)	275 (7.1)	225 (7.4)	−1.43	−19.35
Mammoplasty	125 (3.2)	102 (2.6)	66 (2.2)	−18.40	−47.20
Axillary osmidrosis surgery	145 (3.7)	125 (3.2)	45 (1.5)	−13.79	−68.97
Vaginal rejuvenation	52 (1.3)	78 (2.0)	35 (1.1)	50.00	−32.69
Total aesthetic procedure	1527 (39.3)	1586 (40.7)	1044 (34.2)	3.86	−31.63
Acute wound repair	590 (15.2)	683 (17.6)	612 (20.0)	15.76	3.73
Chronic wound repair	217 (5.6)	211 (5.4)	208 (6.8)	−2.76	−4.15
Benign surface masses	745 (19.3)	752 (19.3)	698 (22.9)	0.94	−6.31
Malignant surface tumour	90 (2.3)	92 (2.4)	99 (3.2)	2.22	10.00
Scar excision	347 (9.0)	291 (7.5)	215 (7.0)	−16.14	−38.04
Burns	251 (6.5)	165 (4.2)	78 (2.6)	−34.26	−68.92
Congenital malformations	107 (2.8)	116 (2.9)	103 (3.3)	8.41	−3.74
Total restorative procedure	2347 (60.7)	2310 (59.3)	2013 (65.8)	−1.58	−14.23
Gender					
Female	2725 (70.3)	2754 (70.7)	1799 (58.8)	1.06	−33.98
Male	1149 (29.7)	1142 (29.3)	1258 (41.2)	−0.61	9.49
Age group (years)					
<20	719 (18.6)	569 (14.6)	381 (12.5)	−20.86	−47.01
20-29	1278 (33.0)	1429 (36.7)	972 (31.8)	11.82	−23.94
30-39	916 (23.6)	858 (22.0)	738 (24.1)	−6.33	−19.43
40-49	470 (12.1)	493 (12.7)	416 (13.6)	4.89	−11.49
50-59	259 (6.7)	285 (7.3)	291 (9.5)	10.04	12.36
≥60	232 (6.0)	262 (6.7)	259 (8.5)	12.93	11.64

Data are shown as n (%). P-values were calculated by Kruskal–Wallis H test, or Pearson chi-square test, as appropriate.

malignant surface tumour, congenital malformations, and scar excision, while aesthetic procedures include rhinoplasty, blepharoplasty, mammoplasty, botulinum toxin injections, vaginal rejuvenation, and axillary osmidrosis surgery (Figure 2). Chronic wound repair included chronic diabetic ulcers, pressure ulcers, and surgical wound infections. Benign surface masses included melanocytic naevus, lipoma, and sebaceous cyst. Malignant surface tumors included skin squamous cell carcinoma, carcinoma basocellulare, and malignant melanoma. Congenital malformations included cleft lip, facial cleft, microtia, and polydactyly. As shown in Table 2, the number of total aesthetic procedures performed before and after the outbreak differed significantly ($p < 0.001$), while the number of total restorative procedures did not. The reconstruction categories of chronic wound repair, malignant tumors, and congenital abnormalities showed no significant differences before and after the epidemic, but the great majority of cosmetic procedures, with the exception of rhinoplasty, demonstrated considerable declines. Pearson chi-square test results revealed statistically significant differences between the constituent ratios in 2018, 2019, and 2020 (χ^2=28.722, df=2, $p < 0.001$). Post hoc analysis was performed using the z-test to compare column proportions, and p-values were adjusted using the Bonferroni method. The results indicated no statistically significant difference between the constituent ratios of the procedures in 2018 and 2019, but a significantly different constituent ratio in 2020 than those in 2018 and

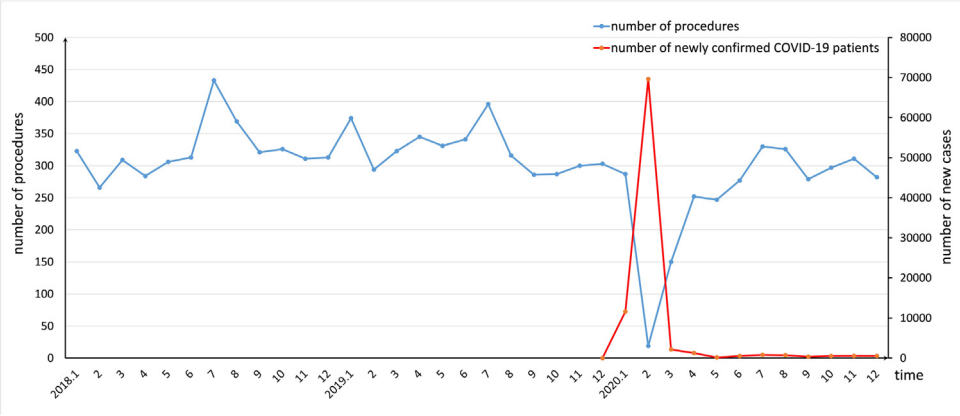

Figure 1 The number of procedures and newly confirmed COVID-19 patients per month during the three years.

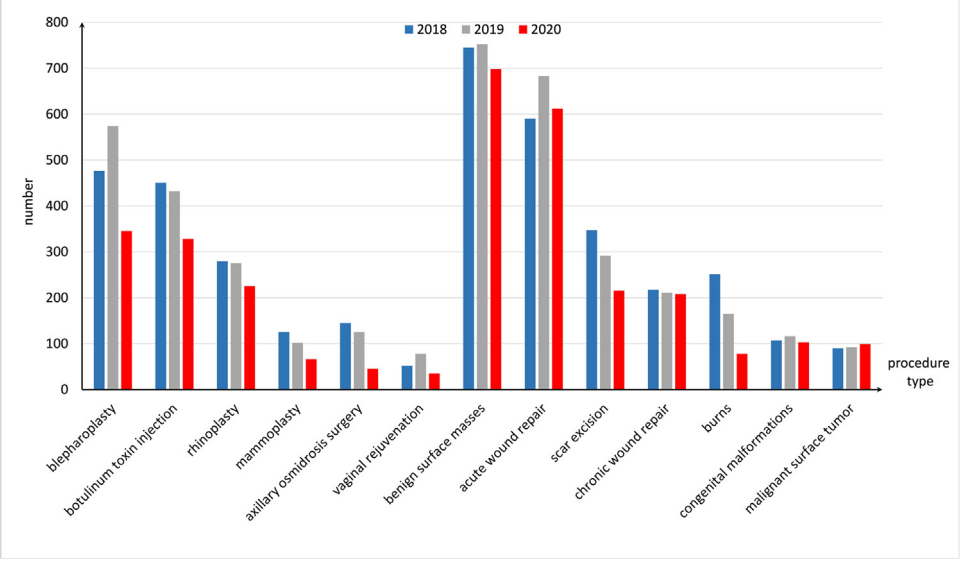

Figure 2 The number of patients in different procedures during the three years.

Table 2 Comparison of the monthly average volume of different procedures in 2020 (pandemic) and 2019 (pre-pandemic).

Procedure type	Pre-pandemic Mean ± SD	Pandemic Mean ± SD	P-value
Blepharoplasty	47.83±8.07	28.75±12.82	<0.001
Botulinum toxin injection	36.00±4.81	27.33±14.32	0.067
Rhinoplasty	22.92±5.90	18.75±10.13	0.231
Mammoplasty	8.50±3.39	5.50±3.45	0.043
Axillary osmidrosis surgery	10.42±2.11	3.75±2.45	<0.001
Vaginal rejuvenation	6.50±1.83	2.92±2.23	<0.001
Total aesthetic procedures	**132.17±11.95**	**87.00±31.25**	**<0.001**
Acute wound repair	56.92±8.14	51.00±22.12	0.399
Chronic wound repair	17.58±9.58	17.33±9.10	0.948
Benign surface masses	62.67±13.30	58.17±23.85	0.574
Malignant surface tumour	7.67±2.71	8.25±4.02	0.681
Scar excision	24.25±7.42	17.92±9.55	0.084
Burns	13.75±7.76	6.50±3.06	0.009
Congenital malformations	9.67±6.49	8.58±6.24	0.681
Total restorative procedures	**192.50±27.58**	**167.75±63.7**	**0.231**

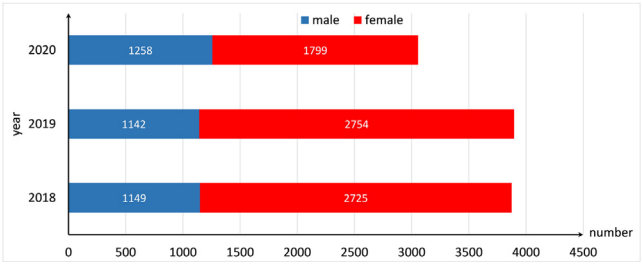

Figure 3 The number of patients in different genders during the three years.

2019. A total of 1527 and 1586 aesthetic procedures were performed in 2018 and 2019, respectively, compared with only 1044 procedures in 2020. The total number of aesthetic procedures in the pandemic period decreased by 34.17% in 2020 than that in 2019. However, restorative procedures in 2020 (2013 cases) only decreased by 12.86% than the same period in 2019 (2310 cases).

Female patients were the predominant patients in our department before and during the epidemic

In 2020, after the outbreak of COVID-19, 1799 women were admitted to the Department of Plastic and Aesthetic (Burn) Surgery, representing 58.84% of all patients. However, the percentages of female patients were 70.34% and 70.69% in 2018 and 2019, respectively (Figure 3). Pearson chi-square test results revealed statistically significant differences amongst the gender constituent ratios in 2018, 2019, and 2020 (chi-squared=135.616, df=2, $p < 0.001$). Post hoc analysis was then performed using z-tests to compare column proportions and adjustment of p-values using the Bonferroni method. The results showed no statistically significant difference between the gender constituent ratios in 2018 and 2019, while the gender constituent ratio in 2020 differed significantly from those in 2018 and 2019. As shown in Table 3, female patients mainly underwent aesthetic and restorative procedures before and during the epidemic, respectively. In contrast, male patients underwent mainly restorative procedures during the entire period. Further analysis showed that 91.75%, 92.18%, and 90.71% of patients who underwent aesthetic procedures at our department in 2018, 2019, and 2020, respectively, were female. In contrast, men comprised 10% of patients who underwent aesthetic procedures for all three years. The female:male gender ratio for aesthetic procedures was as high as 9:1. However, the percentages of women who underwent restorative procedures in 2018, 2019, and 2020 were 56.41%, 55.93%, and 42.32%, respectively.

Young patients aged 20-29 years were the predominant patients in our department before and during the epidemic

The average ages of the patients in 2018, 2019, and 2020 were 31.10, 32.36, and 34.55 years, respectively. For further analysis, patients with restorative or aesthetic needs were divided into six age groups: <20, 20-29, 30-39, 40-49, 50-59, and ≥60 years of age (Figure 4). Kruskal-Wallis H test was performed because the number of patients in each age group was not normally distributed. We observed differences in the distributions of age groups between any two of the three years. As shown in Table 4, patients of all age groups predominantly underwent restorative procedures before and after the epidemic. The survey data in 2018 showed that the largest group of patients admitted to the Department of Plastic and Aesthetic (Burn) Surgery (32.99% of patients) were young adults aged 20-29 years. In 2019, patients aged 20-29 years also comprised the largest group (36.68%), followed by those aged 30-39 years (22.02%). Similarly, in 2020, the largest age group was those aged 20-29 years (31.79%). The percentages for those aged 20-39 years were 56.63%, 58.70%, and 55.94% in 2018, 2019, and 2020, respectively.

Discussion

This direct study analysed clinical data to assess the consequences of the COVID-19 pandemic on plastic surgery. We analysed the severity and evolution across multiple dimensions in 10,827 patients in the three years before and after the outbreak. As several studies have described,[10,11] the pandemic has restricted the development of the plastic surgery industry because of factors such as changes in the allocation of health resources and industry policy,[12] as well as financial and psychosocial factors.[7,13] One of the psychological factors that stands out is that the acceptance of operations during the pandemic period can be influenced by the fear of people concerning the risk of getting infected. The total volume of procedures performed in the plastic surgery industry was significantly lower than that before the pandemic. Figure 1 shows that the number of novel coronavirus infections per month was inversely proportional to the number of restorative and aesthetic procedures per month, which peaked in February. This was helped by the Chinese government's swift action to develop the Chinese health emergency system to contain the outbreak, such as strictly controlling the epidemic area, stepping up publicity, and dispatching medical teams from all over the country to support Hubei Province.

We found that young patients aged 20-29 years were the predominant patients in our department before the pandemic, a finding consistent with those of previous studies.[14] Patients aged 20-29 years were also the main group during the pandemic in our study. The underlying causes of this phenomenon during COVID-19 are likely to be multifactorial.[15] Restorative procedures accounted for 65.8% of patients during the pandemic, most of whom were aged 20-29 years. While young people have a comprehensive understanding of basic medical care[16] and epidemic prevention and control[17] and can seek medical treatment[18] in the case of physical problems, they also have high requirements regarding their aesthetic appearance.[19] In February 2020, only 19 patients were admitted to our department, most of whom underwent restorative procedures, including burns, acute wound repair, and malignant surface tumour. However, assessment of the monthly changes in surgery volume

Table 3 Procedure options for different genders in 2020 (pandemic) and 2019 (pre-pandemic).

Gender	Pre-pandemic Sorting of the procedure	Number	Pandemic Sorting of the procedure	Number
	Acute wound repair	**453**	**Acute wound repair**	**421**
	Benign surface masses	**357**	**Benign surface masses**	**420**
	Scar excision	**81**	**Scar excision**	**107**
	Blepharoplasty	69	Chronic wound repair	95
	Burns	61	Blepharoplasty	58
	Chronic wound repair	35	Malignant surface tumour	42
Male	Rhinoplasty	28	Botulinum toxin injection	31
	Axillary osmidrosis surgery	23	Burns	29
	Botulinum toxin injection	19	Rhinoplasty	28
	Congenital malformations	11	Congenital malformations	15
	Malignant surface tumour	4	Axillary osmidrosis surgery	6
	Mammoplasty	1	Mammoplasty	6
	Vaginal rejuvenation	0	Vaginal rejuvenation	0
	Blepharoplasty	**505**	**Botulinum toxin injection**	**297**
	Botulinum toxin injection	**413**	**Blepharoplasty**	**287**
	Benign surface masses	**395**	**Benign surface masses**	**278**
	Rhinoplasty	247	Rhinoplasty	197
	Acute wound repair	230	Acute wound repair	191
	Scar excision	210	Chronic wound repair	113
Female	Chronic wound repair	176	Scar excision	108
	Congenital malformations	105	Congenital malformations	88
	Burns	104	Mammoplasty	60
	Axillary osmidrosis surgery	102	Malignant surface tumour	57
	Mammoplasty	101	Burns	49
	Malignant surface tumour	88	Axillary osmidrosis surgery	39
	Vaginal rejuvenation	78	Vaginal rejuvenation	35

Table 4 Procedure options for different age groups in 2020 (pandemic) and 2019 (pre-pandemic).

Age group	Pre-pandemic Sorting of procedure	Number	Pandemic Sorting of procedure	Number
(years)	Benign surface masses	133	Benign surface masses	90
<20	Scar excision	120	Scar excision	80
	Burns	94	Congenital malformations	52
	Acute wound repair	291	Acute wound repair	182
20–29	Blepharoplasty	300	Botulinum toxin injection	180
	Benign surface masses	208	Benign surface masses	168
	Acute wound repair	167	Acute wound repair	181
30–39	Blepharoplasty	148	Benign surface masses	158
	Botulinum toxin injection	146	Botulinum toxin injection	99
	Acute wound repair	116	Acute wound repair	124
40–49	Benign surface masses	107	Benign surface masses	119
	Botulinum toxin injection	71	Botulinum toxin injection	37
	Benign surface masses	100	Benign surface masses	88
50–59	Acute wound repair	43	Acute wound repair	63
	Chronic wound repair	36	Chronic wound repair	43
	Benign surface masses	83	Benign surface masses	75
≥60	Malignant surface tumour	55	Malignant surface tumour	59
	Chronic wound repair	42	Acute wound repair	39

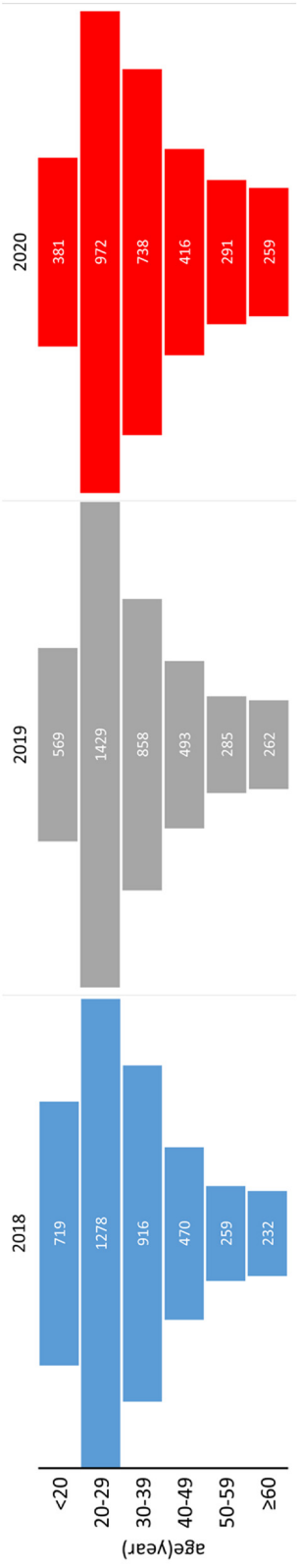

Figure 4 The number of patients in different age groups during the three years.

showed a steady increase in the number of patients in our department since April 2020, even reaching pre-epidemic levels in some months. China drastically decreased its rate of new cases in the early stages of the COVID-19 outbreak than that in other countries as government-mandated quarantines took effect.[20] Table 1 shows higher proportions of male patients, patients undergoing wound repair, and patients >50 years of age during the pandemic. These data showed the significant negative impact of COVID-19 on cosmetic surgery. However, because restorative procedures are considered basic medicine, public hospitals assume greater responsibility to solve these problems, which may explain why the epidemic has had a less negative impact on public hospitals than on private hospitals.

The Centers for Disease Control and Prevention and the American College of Surgeons published an updated classification of patients in the Department of Plastic and Reconstructive Surgery during this period, which mainly included low-acuity healthy patients, low-acuity unhealthy patients, intermediate-acuity healthy patients, intermediate-acuity unhealthy patients, high-acuity healthy patients, and high-acuity unhealthy patients.[21] We observed significant declines in aesthetic procedures since the start of the COVID-19 pandemic ($p<0.001$), particularly in blepharoplasty ($p<0.001$), vaginal rejuvenation ($p<0.001$), axillary osmidrosis surgery ($p<0.001$), and mammoplasty ($p = 0.043$) (Table 2). This is consistent with data from other countries.[22] The patients' cognitive level was improved, and they were concerned about infection in medical facilities.[7] The epidemic has led to a decline in the national economy and a marked increase in bankruptcy and unemployment rates.[23] Public hospitals tended to cut back on aesthetic procedures and focus resources on fighting the epidemic.[24] However, restorative procedures were stable during the COVID-19 pandemic, particularly cosmetic sutures. In addition, many patients in our department showed acuity. As advocated by the American Society of Plastic Surgeons, postponing all elective operations and minimizing operating room and hospital times were important.[22]

Most patients in this study were females. However, the number of female patients decreased significantly in 2020 than the gender ratios in 2018 and 2019. The top three procedures for female patients before COVID-19 were generally aesthetic procedures, including blepharoplasty (505), botulinum toxin injection (413), and excision of benign surface masses (395), while restorative procedures accounted for the largest part during COVID-19, including excision of benign/malignant body surface masses (335), acute/chronic wound repair (304), and botulinum toxin injection (297) (Table 3). Women constitute the major proportion of aesthetic procedures, creating a gender imbalance in private clinics.[25] Patients hospitalized with malformation reconstruction problems undergoing reconstructive surgery in public hospitals show no significant difference in the numbers of male and female patients. The decline in females amongst plastic surgery patients was associated with the severe impact of the pandemic on cosmetic surgery. The reconstructive procedure, as a category of nonelective surgery, has supported the departments of plastic reconstructive surgery in public hospitals during COVID-19. There are several interesting points that we can see in our data.

First, there was no significant difference in the number of chronic wound repairs before and after the epidemic, particularly in flaps after cancer ablation. A large proportion of patients with chronic wounds are referred from other medical specialties. The female group showed a downward trend, and the male patients increased slightly compared with those before the epidemic. Second, the congenital malformation patients who came to the hospital were more common in females. The number of patients with congenital anomalies decreased slightly during the epidemic period, but the sample size is relatively insufficient, which may need to be supported by large sample data.

The Chinese government and its people have made tremendous efforts to overcome the challenges posed by the COVID-19 pandemic. With the emergence of COVID-19 in December 2019, the Chinese government took decisive measures to establish a rapid response mechanism for disease prevention and control, as well as a national, provincial, and regional emergency response mechanism for public health emergencies,[26] to slow the viral spread by shutting down cities on 23 January 2020. At the same time, all patients with COVID-19 were offered free medical care. Subsequently, the government has developed different epidemic prevention policies[27] for different industries and regions to better prevent outbreaks. Furthermore, national education on infectious diseases was implemented in China, which targeted the real-time dissemination of epidemic-related news through social networks such as WeChat and Weibo.[28] In our hospital, all health-care workers are required to perform daily self-health monitoring and all people entering and leaving the hospital must undergo temperature monitoring and health passport checks. Meanwhile, fast and accurate self-testing tools are evolving and can be used for the rapid and comprehensive inspection of people around the epidemic areas.[29] The principle of building a universal, comprehensive health system has been implemented in China.[3] Sufficient, equitable access and safe vaccines have been made widely available to the population, and the acceptance rates of the COVID-19 vaccine amongst Chinese people are as high as 90%.[17,30] China has also implemented a strong strategy for comprehensive health prevention, such as maintaining regular physical activity and strengthening mental and psychological treatments. In other words, only a concerted scientific response can bring the epidemic to a quicker end.

This study has several limitations. First, the sample size may have been insufficient for more significant results, although the study hospital is typical and representative of public hospitals in China. Second, a larger test power yielded impractical sample sizes for a single-centre study. Thus, a multicenter study with larger sample sizes is needed. Third, while private hospitals account for a large proportion of the cosmetics industry, this study did not enrol patients in private hospitals whose main purpose for treatment was improving their appearance. Although there are many private plastic surgery hospitals in China, their scale is not large; thus, it is not possible to find representative institutions. Finally, the study was limited to the first three years of the outbreak; however, the global epidemic is still not fully understood. Further efforts are needed to study the future trends in the plastic surgery industry to better address problems due to the epidemic.

Conclusions

The COVID-19 pandemic poses an enormous threat to the plastic surgery industry. COVID-19 has had a greater impact on aesthetic procedures in China than that on restorative procedures. Women constitute the majority of people undergoing aesthetic procedures. However, while equal numbers of men and women underwent restorative procedures during the COVID-19 pandemic, patients aged 20-29 years comprised the primary group undergoing plastic surgery, even during the pandemic. Thanks to the active, timely, and accurate implementation of epidemic prevention strategies, COVID-19 was quickly brought under control and the plastic surgery industry developed rapidly in China. Our findings provide a reference for the evaluation of the severity of the effects of COVID-19 on the plastic surgery industry.

Declaration of Competing Interest

None.

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Ethical Approval

Not required.

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