JOURNAL OF PLASTIC SURGERY AND HAND SURGERY
2023, VOL. 58, 89–95
https://doi.org/10.2340/jphs.v58.7314

REVIEW ARTICLE

Management of common conditions of the musician: a narrative review for plastic surgeons

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ABSTRACT

Career-related injuries and disorders in professional musicians are prevalent across all their respective instruments and fields. They often endure long hours of intensive practice that demand high levels of precision, dexterity, and flexibility of their head, neck, hands, and upper extremities. Unlike the average patient, musicians are sensitive to even mild symptoms and deficits that can interfere with performance, which can potentially be career-threatening. Increasing attention to the care of musicians motivated performing arts medicine to tailor the practice to their individual and unique needs. Plastic surgeons are at the forefront of this practice; however, there are very limited reviews discussing plastic surgery management of the common injuries and disorders in musicians. This article reviews the most relevant literature of the past several decades regarding treatment modalities of the most common conditions endured by professional instrumentalists, with an emphasis on surgical considerations in the field of plastic surgery. A thorough literature search was performed for articles that encompass the interface between plastic surgery and musicians. We examined disorders of the head, ears, eyes, nose, throat, hands, and upper extremities including stress velopharyngeal incompetence, disruption of the embouchure, nerve entrapments, arthritis, traumatic injuries, focal dystonia, Linburg–Comstock syndrome, and overuse disorder. Overall, the goal of this review is to provide a summary of the existing and successful procedures performed to address prevalent musician conditions.

ARTICLE HISTORY
Received 16 Jan 2023
Accepted 1 Aug 2023

KEY WORDS
musicians; instrumentalists; musician injuries; stress velopharyngeal insufficiency; overuse syndrome

Introduction

Music, like the practice of medicine, is a universal language that transcends language barriers and plays an important role in our society. In the United States alone, more than 50% of households have at least one member that plays a musical instrument [1]. According to a report from the US Bureau of Labor Statistics in 2020, over 30,000 individuals identify as professional musicians, pursuing it as a career [2]. Often, professional musicians are required to practice their craft for multiple hours every day, which involves fine motor movements, posture, and coordination of their upper extremities, head, and neck. These movements demand precision, endurance, flexibility, and dexterity. Thus, they are exposed to high risks of injury from repetitive overuse, which is less forgiving of functional deficits than that of an average patient.

Historically, musicians have been wary of seeking medical care for their injuries due to the fear of risking their careers from procedural complications [3]. Musicians would often receive the same treatment as their non-musician counterparts, and little attention would be given to their requirements specific to their occupation – as it would for athletes or patients in sports medicine – leading to devastating career consequences and the stifling of their artistry. Perhaps one of the earliest and most notable examples was in the early 1800s, when Robert Schumann designed a sling to hold an injured finger away from the piano instead of seeking medical care, which led to the sidelining of his career as a piano performer [4].

It is crucial for plastic surgeons to evaluate musicians holistically and understand their constraints in order to recommend the most appropriate procedure and promptly aid their return to work. It is highly recommended for plastic surgeons to carefully observe and evaluate the way certain musicians operate their instruments in order to analyze details of the sensory, strength, and dexterity needed for performance. As this practice is paramount to providing the best and most appropriate management for musicians [5], our aim is to provide a historical review of the interface between plastic surgeons and musicians, with an emphasis on special surgical considerations of their management.

The aims of this study are to (1) summarize the most frequent plastic surgery related conditions faced by musicians, (2) discuss the surgical and non-surgical interventions plastic surgeons have used to treat musicians, and (3) recommend considerations when treating musicians as a subset of our patient population.

Materials and methods

To do this, we queried the MEDLINE and Google Scholar databases for literature pertaining to plastic surgery interventions for musicians. Search terms included combinations of 'Plastic Surgery and Musicians', 'Musician Plastic Surgery', 'Musician Injury and Surgery', 'Reconstructive Surgery and Musicians', 'Musicians and Hand Surgery', and 'Surgery and Musician', which yielded 142 records. Inclusion criteria were articles that outlined surgical and non-surgical management for musicians. Records not available in the English language and those discussing management of conditions not specific to musicians were excluded. Forty-six publications met the criteria for inclusion in this review. Summaries of the interventional approaches for all disorders of the head, ears, eyes, nose, and throat

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Table 1. Interventional approaches for the disorders of the head, ears, eyes, nose, and throat in musicians.

Author	Year	Instrument	Condition	Management	Outcome
Massengill et al. [11]	1974	Bassoon	SVPI	Palatal sucking exercise for 10 min per day	Full functional recovery at 6 months follow-up and reported pre-morbid conditions of playing
Conley et al. [12]	1995	Trumpet	SVPI	Palatal sucking exercise for 10 min per day	Functional recovery up to 90 min of playing without nasal air escape after 1 year follow-up
Whitehand et al. [13]	2009	Trumpet	SVPI	Nose peg during practice/ performance	Patient able to play for extended periods without nasal escape when wearing device
Klotz et al. [14]	2001	French horn and oboe	SVPI	Autologous fat transfer to soft palate	Complete resolution of symptoms and return to activity 2 weeks after intervention and no occurrence after 1 year follow-up
Syamal et al. [15]	2017	Trombone and saxophone	SVPI	Autologous fat transfer to posterior pharyngeal wall	Complete resolution of symptoms after 2 weeks; posterior pharyngeal wall significantly augmented. Trombone player remained symptom free at 3-year follow-up. Saxophonist was symptom-free for only 3 weeks before relapse
Koprowski et al. [16]	2018	Clarinet	SVPI	Pharyngeal augmentation via hyaluronic acid injection	Endoscopy showed no further leakage while playing and patient experienced full functional recovery at 6-month follow-up
Gordon et al. [17]	1994	Bassoon	SVPI	Pharyngeal augmentation via teflon injection	Endoscopy showed no further leakage and patient experienced full functional recovery 1 year after augmentation without change and recurrence of symptoms
Dibbell et al. [6]	1979	Trumpet and oboe	SVPI	V-Y pushback palatoplasty with superiorly-based pharyngeal flap	Both patients experienced complete resolution of symptoms and returned to playing after 6 weeks. Both remained symptom-free at 1.5- and 2-years follow-up
Visser et al. [8]	2012	Clarinet	SVPI	Inferior-based pharyngeal flap	Full functional recovery for both patients and both resumed playing in 4 weeks and remained asymptomatic 2 and 4 years postoperatively
McVicar et al. [18]	2002	Clarinet	SVPI	Sphincter pharyngoplasty with superiorly-based palatopharyngeal muscle flaps	Patient resumed playing after 4 weeks and remained asymptomatic 2 years postoperatively
Papsin et al. [19]	1996	General brass instruments	Embouchure injuries	Surgical repair of muscle defect near embouchure	All nine musicians returned to playing after 6–12 weeks and reported premorbid levels of performance with no major complications or recurrences
Lee J et al. [20]	2020	Trumpet	Soft-tissue depression of lower lip after Moh's resection	Lip reconstruction with mucosal V-Y advancement flap and acellular dermal allograft	Patient resumed playing in 8 weeks and is very satisfied with his performance operative; however, patient was not able to hit the high notes.

SVPI: stress velopharyngeal incompetence.

Here, we provide the summaries of the conditions, management, and outcomes of all the publications discussed in this review regarding disorders of the head, ears, eyes, nose, and throat.

(HEENT) are detailed in Table 1 and approaches for disorders of the hand and upper extremities in Table 2.

Disorders of head, ears, eyes, nose, and throat

Stress velopharyngeal incompetence

While stress velopharyngeal incompetence (SVPI) may have inconspicuous manifestations in most individuals, it is a career-threatening condition affecting musicians who are brass and woodwind instrumentalists [6]. SVPI is a condition that results from the abnormal movement of the velum (soft palate), which separates the oropharynx from the nasopharynx. It can arise from congenital anomalies including anatomical and structural defects such as cleft palate, post-adenoidectomy state, and neuromuscular disorders [7]. It is a structural or functional pathology due to an inability to properly seal the soft palate against the pharyngeal wall, resulting in nasal air leakage [7, 8]. Because these professional musicians depend on sustaining high intraoral pressures while performing their instrument, this loss of pressure through nasal emission greatly impacts and impairs their performance and their careers [6–9]. It is quite uncommon with only 45% of plastic surgeons and otolaryngologists reported being familiar with SVPI and 27% reported ever seeing a patient with this condition [9]. Despite this, studies have reported up to 34–39% prevalence of SVPI in musicians [7, 9]. The intraoral pressure in normal speech rarely exceeds 5–6 mm Hg and at this low pressure, the manifestation of SVPI is not apparent; however, brass and woodwind instrumentalists can reach as high as 130 mm Hg during performance.

Currently, there is no clear consensus in the management for SVPI [7]. Many previous case reports and articles have described treatment approaches of SVPI for musicians ranging from conservative modalities to operative interventions [7, 10–18]. Conservative approaches include rest, speech therapy, and physical therapy [7, 10]. One non-surgical strategy employed by physical therapy is a palatal sucking exercise, which entails sucking through a straw to hold a small piece of paper to the bottom of the straw by suction, yielding full functional recovery in a bassoonist patient after a 2 year follow-up [11, 12]. One case reported a simple solution of using a nose peg device to prevent nasal air escape during performance [13]. Other case reports have discussed minimally invasive and effective injection augmentation procedures. In one case report, 5.0 mL and 2.4 mL of

Table 2. Interventional approaches of hand and upper extremity disorders in musicians.

Author	Year	Instrument	Condition	Intervention	Outcome
Hoppmann et al. [24]	1997	French horn	Ulnar nerve entrapment	Decompression surgery of the ulnar nerve	Complete resolution of symptoms and full functional return to performance 3 months postoperatively
Ell et al. [31]	2005	Guitar	IPJ RA of both thumbs	Arthroplasty of right thumb and arthrodesis of the left thumb	Full functional recovery and return to playing with variable mobility at a minimum of half a year after operation
Crabb et al. [3]	1980	Guitar	Right hand middle MCPJ arthritis	Extensor indicis transfer, free cartilage graft to MCP joint, temporary silastic spacer	Regained sufficient independent extension with greater range of flexion
Schwartz et al. [34]	1998	Violin	Left index finger DIPJ arthritis	Swanson hinge implant arthroplasty on affected DIP joint	Returned to playing at 3 months postoperatively without pain and fatigue. A 10-month follow-up revealed no complications
Ragoowansi et al. [35]	2008	Piano	Basal thumb joint arthritis	CMC joint trapeziectomy with fascial interposition supplemented with Swanson silastic trapezium prosthesis and ligamentous sling to stabilize base of thumb MC	Return to full-time playing 12 to 16 weeks postoperatively. A 5-year follow-up revealed no complications
Watkins et al. [33]	2015	Clarinet	Extensor digitorum communis and extensor digitorum quintus rupture	Extensor indicis proprius to extensor digitorum communis transfer	Physical therapy aided functional healing and the musician resumed playing after 1 month and still doing well 15 months postoperatively with no complications
Minami et al. [32]	2017	Erhu (Chinese string instrument)	Right hand deformity with unstable ulnar deviation of the MCPJ from the index to the little finger and hyperextension of the thumb IPJ	Little finger metacarpophalangeal joint arthrodesis, and transfer of the fourth dorsal interosseous muscle to the little finger	Functional restoration after 2 months of rehabilitation
Cobley et al. [36]	1999	Piano	Traumatic digital amputation of little finger	Osseodistraction using a mini external distraction device to elongate little finger by 2 cm in 6 weeks	Great cosmetic results after 8 weeks and bone consolidation was achieved in 6 months. Elongated digit is stable and has good sensation. Patient free from complications and able to return to performance in 6 months
Tuncer et al. [37]	2014	Saz (Turkish string instrument)	Traumatic amputation of left thumb distal at the MCP level	Toe-to-thumb reconstruction consisting of a second toe transfer from the right foot of the patient	Patient experienced no postoperative complications and showed good strength in opposition, adduction, and IP flexion at 3-month follow-up and was able to properly play his instrument
Strub et al. [38]	2012	Guitar	Right index finger DIPJ defect from traumatic injury	Homodigital island flap functional reconstruction with vascularized extensor tendon	Patient had functional recovery and returned to playing his guitar with no restriction of movement 3 months postoperatively
Winspur et al. [39]	2009	Violin and piano	Wrist fracture injury that interferes with wrist rotation	Darrach procedure (resection of the distal ulna)	All five patients had full functional recovery and returned to their respective instruments with an average of 5.8 months of recovery
Karalezli et al. [47]	2006	Violin	Linburg-Comstock syndrome	Excision of the tenosynovial interconnection between digits	Patients returned to playing after 3 weeks and 6-month follow-up revealed full pain-free function and functional recovery with no complications.

MCPJ: metacarpophalangeal joint; DIPJ: distal interphalangeal joint.

Here, we provide the summaries of the conditions, management, and outcomes of all the publications discussed in this review regarding disorders of the hand and upper extremities.

autologous fat was transferred to the soft palate in SVPI patients (French horn and oboe players), resulting in a complete resolution of symptoms and return to activity 2 weeks after intervention and no recurrence after 1 year follow-ups [14]. Similarly, autologous fat was injected into the posterior pharyngeal wall of a trombone and saxophone player with SVPI; both musicians had complete resolution of symptoms after 2 weeks when follow-up assessment demonstrated the posterior pharyngeal wall was significantly augmented [15]. However, these benefits only lasted for 3 weeks for one patient while the other patient remained symptom free during a 3-year follow-up. Other cases showcased the effectiveness of pharyngeal augmentation via submucosal injection with 3 mL of Teflon (bassoonist) and 1.8 mL hyaluronic acid (clarinetist) as bulking agents with endoscopic confirmation showing no further leakage and both musicians were symptom-free and able to resume their musical careers after 1 year and 6-month follow-up, respectively [16, 17].

Different viable surgical approaches can be considered and performed by plastic surgeons to treat SVPI. Dibbell et al. discussed their experience of successfully executing a V-Y pushback palatoplasty with superiorly based pharyngeal flap in a trumpeter and an oboist

[6]. This V-Y pushback was successful because it provided a functional solution; the V-Y flap aids and supports the palate above, thus preventing herniation into the nasopharynx [6]. Both patients experienced complete resolution of symptoms and returned to playing after 6 weeks. They remained SVPI free 1.5 and 2 years postoperatively and were able to pursue their musical careers [6]. Visser et al. described achieving symptom freedom from SVPI in clarinetists after performing an inferior-based pharyngeal flap, frequently used in cleft palate surgery [8]. The clarinetists resumed playing after 4 weeks and remained asymptomatic 2 and 4 years postoperatively. Furthermore, McVicar et al. documented a case where a sphincter pharyngoplasty with superiorly based palatopharyngeal muscle flaps was performed on a clarinetist; the patient resumed clarinet playing after 4 weeks and remained asymptomatic 2 years post operation [18].

Other HEENT considerations

Woodwind and brass musicians may experience other HEENT complications that can potentially be career-ending, including injury to the embouchure – the interface between the player's lips and an instrument's mouthpiece – from chronic pressure associated with playing wood wind and brass instruments, as well as defects of the lip secondary to Mohs Micrographic Surgery. The embouchure is imperative for the proper production of sound, tonal manipulation, and overall musical expressiveness [19].

Disruption of the embouchure, such as injury to the orbicularis oris muscle (Satchmo's syndrome), greatly affects the performance of woodwind and brass musicians [19]. Not only does injury to the orbicularis oris stifle the quality of performance but it is also associated with pain and fatigue. Papsin et al. described nine brass players who underwent surgical repair of the orbicularis oris muscle [19]. The operative technique was described as wide-awake surgery with the patient participating during the procedure. After isolating the muscular defect, a skin flap was raised overlying it, and the patient is asked to increase intraoral pressure to pinpoint the defect visually. Interrupted 4-0 Vicryl sutures were used to reapproximate the healthy muscle edges [19]. All nine musicians who underwent the procedure returned to their playing after 6 to 12 weeks and reported premorbid level of performances with no major complications or recurrences.

Another recent case described a trumpeter who was unable to play his instrument after Moh's resection for squamous cell carcinoma of his lower lip [20]. This was due to soft-tissue depression at the site of the reconstruction, which prevented him from being able to properly seal his lips around the mouthpiece [20]. After hyaluronic acid filler treatments proved unsuccessful, the patient underwent lip reconstruction with mucosal V-Y advancement flap augmented by an acellular dermal allograft to fill the soft-tissue defect for an overall stronger seal [20]. The patient was able to resume playing in 8 weeks and remained satisfied with his ability to perform postoperatively, though his notes were limited to those lower on the scale. Table 1 provides a summary of all the interventional approaches to HEENT disorders discussed here.

Disorders of the hand and upper extremity

Upper-extremity surgery is a crucial component of a musician's care, as almost all musicians depend on properly functioning hands and upper extremities to be able to perform their instrument. Plastic surgeons operate on musicians' hands much more frequently than HEENT syndromes. There are a myriad of different hand and upper extremity conditions that musicians may encounter throughout their careers, all of which present complications that inhibit the musical performance and practice of their instruments. These pathologies include entrapment neuropathies, arthritis, amputation, Linburg–Comstock Syndrome, overuse syndrome, and focal dystonia. The interventional approaches to the hand and upper extremity disorders are summarized in Table 2.

Nerve entrapments

Nerve entrapment syndromes are common among all musicians, including compression of the median nerve at the wrist (carpal tunnel syndrome) and the ulnar nerve at the elbow (cubital tunnel syndrome) [21]. Carpal tunnel syndrome is the most common entrapment neuropathy in both musicians and in the general population [22], and definitely one of the most common syndromes that plastic surgeons treat. In one particular study, Lederman et al. reported 143 of 640 musicians (22%) had entrapment neuropathy [23]. Overall, the assessment and treatment of compressive neuropathies for musicians is identical to non-musicians [5]. Early diagnosis via physical exam and electrodiagnostic studies is of the utmost importance [24].

Conservative treatment modalities are similar across all types of entrapment neuropathies and should be first considered with postural changes, physical therapy, bracing splinting, nonsteroidal anti-inflammatory drugs (NSAIDs), steroid injections, and rest [5, 25]. These non-surgical, conservative modalities are important in musicians who might be especially sensitive to even mild symptoms and deficits of these conditions and relief thereof. Thus, the risks versus benefits of surgery must be weighted carefully. Surgical release and decompression may be indicated if the musician's career is at stake and if conservative management is ineffective.

In cases refractory to conservative therapy, and when surgery is indicated, it is imperative to perform the surgery at its early stages for rapid return to music performance and prevent muscle wasting [5, 21, 25, 26]. Surgical management of carpal tunnel syndrome involves median nerve release by dividing the transverse carpal ligament [27]. Open carpal tunnel release is the most common technique involving the dissection of the transverse carpal ligament [27, 28]. However, the open release carries a significant recovery time before musicians can play pain free and is associated with risks to palmar cutaneous nerve damage, which is not ideal for musicians [28]. Minimally invasive intervention, such as endoscopic or mini-open procedures, are also viable options for carpal tunnel syndrome [27, 29]. Both techniques minimize surgical trauma and require less recovery time; however, such procedures are associated with increased risks of incomplete release of the transverse carpal ligament, leading to recurrence of carpal tunnel syndrome [29]. We recommend weighing the risks and benefits of either approach with each patient on an individual basis.

With ulnar neuropathy, simple decompression or transposition may be indicated [25]. While outcomes have been very successful in musicians with these types of treatments, the results must be guarded since outcome measures were not clearly described [30]. One specific example showcased a left elbow ulnar nerve entrapment in a French horn player who presented with a vague left arm and hand pain for 2 months that greatly affected instrument playing [24]. After conservative management failed to alleviate symptoms for several months, decompression surgery of the ulnar nerve at the left elbow drastically improved symptoms and the patient had complete resolution of symptoms and was able to return to playing 3 months postoperatively.

Arthritis

Arthritis (osteoarthritis, rheumatoid arthritis [RA] or other degenerative joint diseases) and the concomitant symptoms of pain, swelling, and mobility issues, can have a profound impact on a musician's

performance in both its early stages (swelling and low-level pain) or late stages (tendon rupture and considerable joint deformity) [31]. Because of the wide range of different complications and the location of arthritis patients, the surgeon should carefully evaluate the patient and how they play their instrument because individualized surgical decisions need to be made with understanding of how a specific instrument is played. While there are multiple ways to repair a ruptured tendon – tendon transposition, tendon transplantation, arthrodesis, or arthroplasty – it is necessary to obtain a full history and examination of the patient, as well as get to know the needs of the instrumentalist. A pianist uses their fingers differently compared with a violinist, which also is very different from the finger technique of trumpeters. For instance, one case report described a case where an arthroplasty was performed on the affected first joint of the right thumb from RA in a guitarist, in order for that finger to be movable for techniques such as finger picking. An arthrodesis was performed for the left thumb of the same patient for the purpose of stabilization of the neck of the guitar, and provide counterweight to the finger pressures on the strings [31]. Ell [31] discussed several operative strategies in the management of different musicians with arthritis. Other published cases of tailored surgical intervention of musicians with arthritis are detailed in Table 2 [3, 32–35].

Traumatic injuries

In the event of traumatic injuries to the hand or upper extremity, plastic surgeons play a major role in the reconstruction of the defect in order to restore function and structure to enable musicians to continue their career. There have been at least four case reports of hand trauma or injury where plastic surgeons were able to successfully restore the musicians' ability to perform their respective instruments.

Cobley et al. presented a young pianist who sustained traumatic digital amputations from a lawn mower accident at the mid shaft of the middle phalanx of the middle and ring fingers, and middle phalanx of the little finger [36]. In order to allow the patient to reach an octave on the piano, reconstruction consisted of lengthening the residuum of a traumatically amputated little finger by osseodistraction on a young pianist using a mini external distraction device to elongate the finger by 2 cm in 6 weeks [36]. The device was removed after 8 weeks, revealing great cosmetic results and bone consolidation was achieved in 6 months. The elongated digit is stable and has good sensation and the patient is free from complications after a 1-year follow-up. In another amputation case, Tuncer et al. describes a musician who had a table saw crush injury that resulted in amputation of their left thumb distal at the MCP level [37]. At this level of injury (mid-level and metacarpal segment injuries), a toe-to-thumb reconstruction was indicated because reimplantation was not feasible [37]. The operation consisted of a second toe transfer due to a better fit to the hand. The patient experienced no postoperative complications and showed good strength in opposition, adduction, and IP flexion at 3-month follow-up and was able to resume playing his instrument [37].

Another case detailed a young musician who sustained a power sander injury on the DIP joint of the right index finger losing skin, subcutaneous tissue, and tendon enthesis from the whole area of the defect, with the bone exposed dorsally [38]. In normal circumstances, arthrodesis is a quick and effective surgical option, but the musician prefers restoration of joint function. Thus, a homodigital island flap functional reconstruction with vascularized extensor tendon was indicated and performed. The patient was able to return to work 8 weeks after surgery and able to play his guitar with no restriction of movement 3 months postoperatively.

In the event of a wrist fracture, resection of the distal ulna (Darrach procedure) has proved to be the ideal operation for musicians where wrist pronation and supination are critical [39]. Winspur et al. details the procedure that was performed successfully on five musicians who were all able to return to their full professional careers [39]. The procedure itself is quick and simple and the recovery is rapid, allowing early rehabilitation on the instrument [39].

Focal dystonia

One particularly debilitating condition that musicians face is focal dystonia, which consists of abnormal involuntary sustained muscle contractions or spasms, leading to abnormal posturing of isolated muscle groups that ultimately interferes with performance [5, 21, 25, 26]. This may manifest as finger flexions, extensions, or tremors while playing the instrument. The etiology is poorly understood and its incidence is estimated to be only 1 in 200 musicians [40]. However, it is deemed one of the most serious medical conditions in musicians and only about 38% of musicians are able to continue playing despite treatment [41].

Treatments for focal dystonia in musicians are presently not effective and include rest, NSAIDs, steroids, tricyclics, bromocriptine, botulinum toxin, biofeedback, psychotherapy, and surgery [21]. The patient may also benefit from occupational therapy and evaluation by a psychiatrist for behavioral interventions that may improve symptoms. This is of particular importance as the patient's focal dystonia may be rooted in psychiatric causes such as anxiety and may manifest through other means such as neurosis as well [41]. Recently, deep brain stimulation has gained attention as a safer and more efficacious neurosurgical option for focal dystonia; however, more studies regarding its long-term outcomes must be assessed [42]. Even with these interventions, focal dystonia may remain refractory and progress in debilitating symptoms for the patient. It is important to tailor treatment modalities across the multidisciplinary team, as individualized treatment plans may often prove more effective.

Linburg–Comstock syndrome

Linburg–Comstock syndrome is a condition characterized by tenosynovial interconnection between the flexor pollicis longus and flexor digitorum profundus tendon of the index finger, which provokes simultaneous flexion of the distal joint of the thumb with the flexion of the distal joint of the index finger [43, 44]. The etiology of whether this anomaly is congenital, acquired, or both is under debate [45]. However, it is undeniable that this condition of coupled flexion is often associated with pain [46] and can greatly impact musicians. Surprisingly, Linburg–Comstock syndrome is incredibly common with a prevalence of 31% but can be up to 60–70% in violinists [43, 44, 46]. While this anatomical variation rarely requires treatment in most individuals, some musicians may pursue the operational avenue. A previous case report of a violinist with Linburg–Comstock demonstrated that the surgery to excise the tendinous connection was quick, safe, and simple; the violinists returned to playing after 3 weeks and 6-month follow-up revealed full pain-free function with no complications [47].

Other considerations

Overuse syndrome is the most prevalent medical condition among musicians, with a lifetime prevalence reported up to 89% [48, 49]. Despite this, its diagnosis and management is poorly defined and an

understudied topic [5]. Overuse syndrome results from significant continuous repetitions and long duration of movements that may further contribute to musculoskeletal sequelae [25]. As an example, one case reported a guitarist who experienced an abducted fifth finger after 8 h of practice [50]. It is usually diagnosed in musicians with non-specific symptoms and pain that cannot be traced to anatomical anomalies in imaging studies [51]; however, there is no objective test and no definitive diagnostic or treatment criteria [21]. Treatments usually entail conservative management that include rest, ice, NSAIDs, and physical therapy. Because of the non-specific and ambiguous nature of this condition, there are no indications for surgical interventions. However, every major injury experienced by musicians, other than congenital anatomical anomalies, are due to overuse in some form.

Conclusions

There are a myriad of interventional approaches for common HEENT, hand, and upper extremity disorders of musicians. Our study is the first to gather all the relevant plastic surgery management interventions of musicians' common conditions. Management of SVPI in the current literature included palatal sucking exercises for 10 min per day, the utilization of nose peg during performance, autologous fat transfer to the soft palate and posterior pharyngeal wall, pharyngeal augmentation via hyaluronic acid or Teflon injection, V-Y pushback palatoplasty, inferior-based pharyngeal flap, and sphincter pharyngoplasty. Injuries to the embouchure were corrected via surgical repair of the muscle defect, and soft-tissue depression of the lower lip after Moh's resection was corrected via lip reconstruction with V-Y advancement flap and acellular dermal allograft.

Literature on musician hand and upper extremity disorders have documented interventions for arthritis including arthroplasty and arthrodesis of digits, extensor indicis transfer, Swanson hinge implant arthroplasty, and CMC joint arthroplasty. Carpal tunnel syndrome was managed by conservative measures and with open, mini-open, or endoscopic carpal tunnel release. Ulnar nerve entrapment was also managed with conservative measures before ulnar nerve decompression surgery was considered. Moreover, traumatic digital amputation interventions include osseodistraction and toe-to-thumb reconstruction. Non-amputating injuries to the digits received a homodigital island flap functional reconstruction with vascularized extensor tendon, wrist fractures underwent Darrach procedure, and Linburg–Comstock syndrome was managed by excision of the tenosynovial interconnections between digits.

Drawing parallels to medicine, Karl Paulnack, the former director of the Music Division of Boston Conservatory once addressed his students with the following quote: 'If you were in medical school, you would take your work very seriously because one day your future patient will waltz into your emergency room at 2AM, and you're going to have to save their life. Well my friends, someday someone is going to waltz into your concert hall at 8 PM and bring you a mind that is confused, a heart that is overwhelmed, and a soul that is weary. Whether they go out whole again will depend partly on how well you do your craft'. Musicians are one of the most beloved and important members of our society and their surgical care must be tailored to their needs. Similar to athletes, they require personalized care and an in-depth understanding of the demands they place on their bodies to properly perform their instrument. Different musicians require unique treatment approaches; therefore, surgical and non-surgical interventions should be modified to meet those demands.

Acknowledgments

We would like to thank the University of Wisconsin Medical Scientist Training Program grant: NIH T32 GM140935 for their support.

Declaration of interests

All authors have no conflicts of interests.

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