Deep Neck Infections - Classification in Levels of Severity

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Summary

Introduction: The cervical spaces infections compose severe pictures and result in a high degree of mortality when they evolve with complications.

Objective: To set up a graduation protocol of the cervical abscesses and organize a sequence to treat these patients.

Method: We carried out a retrospective study of 150 patients with cervical abscess in which we evaluated the clinical impression, general state, respiratory state, locoregional state, antibiotics used and comorbidity. Then we organized a classification with severity levels.

Results: The mean age was of 31 years old and in 37% of the cases the origin was dental. In the locoregional evaluation in 67% the affection expanded up to level I and II. According to the severity, the patients were classified as follows: Level I (46%), II (36%), III (15%) and IV (3%). Only antibiotic therapy was used in 27% of the cases. The association with surgery occurred in 73%

Conclusion: The therapeutic procedure standardization and its classification in severity is essential for the service systematization and reduction of morbimortality.

Keywords: neck, therapeutic procedures, inflammation.

Introduction

Despite the prevalence of deep neck infections (DNI) has been diminished with the modern antimicrobial therapy, these infections remain as a significant cause of morbidity and mortality. The DNIs may arise from several focus of the head and neck and those of dental and adenotonsillar origin are the most common (1).

The understanding of the region anatomy is basic to preview the infection extension and mainly define the surgical treatment. Various fascia layers cover and divide the neck structures by creating virtual spaces. The cervical fascia is divided into deep and superficial. The superficial fascia is immediately below the skin and involve the fatty tissue, nerves, superficial and lymphatic vessels and muscle mimicry. The deep fascia is divided into deep, medium and superficial (2).

At least 11 deep spaces are part of the complex structure formed by the facial plans; they compose possible infection sites and based on their relationship with the hyoid they may be classified as follows: spaces localized above the hyoid level (peritonsillar, submandibular, parapharyngeal, masticatory/temporal, buccal and parotid); spaces that involve the entire circumference of the neck (retropharyngeal, danger space, prevertebral and carotid) and the anterior or pretracheal visceral space, below the hyoid (3).

The DNIs are generally polymicrobial. Among the common agents we find: *Streptococcus viridans, Streptococcus milleri, Prevotella spp, Peptosstreptococcus spp* and *Klebisiella pneumoniae*, and the latter is more common in diabetic patients (4, 5)

The treatment for these patients consists of three main aspects: airways maintenance, antibiotic therapy and surgical management (5).

The main complications include: respiratory obstruction, mediastinitis, pleural empyema, pericarditis, jugular vein thrombosis and septic shock. Despite the complications incidence has diminished as for the pre-antibiotic era, the mortality under such conditions is very high and reaches rates of up to 40 to 50% (6).

Therefore, the classification of these patients according to the severity of the case could be helpful to facilitate the recognition of cases with a higher chance to evolve with complications and then manage the proper treatment and reduce the morbimortality of such cases.

The objective of this paper is to evaluate retrospectively the patients with neck infection of the otorhinolaryngology service of the Federal University of Paraná, in the period from January 2000 to January 2007, to set up a graduation protocol of the cervical abscesses and then organize a protocol for treating these patients.

Method

This study is a retrospective work that met the normative instruction by the ethics and research committee of the Federal University of Paraná (2007/022084).

We evaluated 150 patients with cervical abscess attended in the Otorhinolaryngology service of the Federal University of Paraná, in the period from January 2000 to January 2007.

All patients were evaluated as for the following aspects:
1 - Clinical Impression.
2 - General State.
3 - Breathing Condition.
4 - Locoregional State.
5 - Antibiotic already Used.
6 - Comorbidities.

In terms of clinical impression, the patient was classified as:
1 - Patient Feeling Good
2 - Improvement will Come as Usual.
3 - Patient Feeling Bad.

As for the general state:
1 - Without Signs of Affection.
2 - Minimal Hemodynamic Alteration.
3 - Toxemia.
4 - Shock.

As for their respiratory function:
1 - Without Signal of Breathing Difficulty.
2 - Incipient Signals.
3 - Evident Difficulties.

The locoregional evaluation was classified as:
1 - Level I and II
2 - Up to Level III.
3 - Up to Wishbone.
4 - Cutaneous Emphysema.

As for the use of previous antibiotic therapy:
1 - Without Previous Use.
2 - Adequate, Without Improvement.
3 - Adequate, already Changed, Worsening.

And finally as for the comorbidities presented by the patients:
1 - Without History and/or Signals.
2 - Diabetes Treated and Compensated.
3 - Diabetes Treated and Not Compensated.

After systematic evaluation of all these items, we organized the severity classification.

All patients are submitted to a standard procedure that consists of:
1 - Catheterize the Vein.
2 - Antibiotic Therapy.
3 - Maintenance of the Airways.
4 - Treatment of Comorbidities.
5 - Anti-inflammatory.
6 - Abscess Draining.

When classified in level II, III or IV, we requested an imaging exam - computed tomography with contrast in the axial and coronal incidences for locoregional evaluation and a better surgical planning.

RESULTS

We evaluated 150 patients, all attended at the otorhinolaryngology service of the Clinical Hospital of the UFPR, between January 2000 and January 2007. Amongst whom 80 were of the male sex, and we observed a relation of 4:3 men x women. The mean age was of 31.86 years.

Upon admission, they were examined for clinical impression, general state and respiratory function.

In the probable determination of septic focus, 60 presented with a dental origin (37%), followed by the undefined focus in 49 (33%), pharyngeal and tonsillar infections in 30 (20%), salivary glands infections in 6 (4%) and traumatisms in 5 (3%).

111 (74%) denied the use of previous antibiotic therapy. Out of the group that used it (39), benzathine penicillins were mostly used (8%), followed by first generation cephalosporins (5%)

In 114 patients there was no history of comorbidity (76%). There was 4 cases of diabetes treated and compensated (3%), 5 cases of non-treated or uncompensated diabetes (3%), 2 cases of HIV (1.3%), 1 pregnant and 1 patient with cerebral palsy (0.6%).

As for the locoregional evaluation, in 99 the affection expanded up to level I and II (67%), 35 up to level III (23%), 14 up to wishbone (9%) and 2 cases presented cutaneous emphysema (1%).

The patients were classified as for the case severity. Level I occurred in 69 cases (46%), II in 54 cases (36%), III in 22 cases (15%) and 4 in 5 cases (3%).

The average time until the treatment in our service was of 7.89 days. The average internment time was of 8.48 days. ICU was necessary in 3 cases (2%), with an average of 6 days. There was one case of death.

There was no need for airways maintenance in 133 patients (8%). In the 17 cases in which it was necessary, 4 received oxygen by catheter (3%), 2 were intubated (1%) and 11 were submitted to tracheostomy (7%).

Only antibiotic therapy was the treatment used in 41 cases (27%). There was need for association with surgical draining in 109 (73%). The association of first generation cephalosporin and metronidazol was used in 96 cases (64%). In 27 we chose third generation cephalosporin and metronidazol (18%) and in 9 cases first generation cephalosporin associated to metronidazol and amikacin (6%). Other schemes were used according to individual need.

DISCUSSION

The deep neck infections may arise from several focuses in the head and neck, including teeth, salivary glands, cervical lymphoid tissue and adenotonsillar tissue (1). In the pre-antibiotic era, the pharyngotonsillar infections corresponded to up to 70% of the DNI cases (7). Now, many studies show an important decline of such incidence (7-9). The same thing may be observed in our study, in which the dental focus was taken as the origin of the abscesses in 37% of the patients, while the pharyngeal and tonsillar affections were present in 20% of the cases. It was not possible to identify the probable initial focus of the infection in 33% of the patients. Other authors also reported a significant proportion of deep neck infections of unknown primary origin (1, 6, 8, 10).

The most frequent comorbidities found in the patients with DNI are diabetes mellitus, chronic hepatitis, chronic renal insufficiency and immunodepression states such as HIV/AIDS or patient undergoing chemotherapy (2). In this study 8% of the patients presented comorbidities, with a predominance of diabetes. Although other authors also reported a major incidence of diabetes among the diseases associated to the patients with DNI, our study showed a lower general incidence of comorbidity when compared to other works (7, 8, 12).

Lee *et al* also showed a higher incidence of diabetes among the comorbidities, but in his study, DM was not related to the major rates of complications, even though the authors considered the high risk of complications of these patients, as well as of patients with more than two deep neck spaces involved (8).

In the other hand, Huang *et al* carried out a study in which the authors confirmed that compared to the group of patients without diabetes and with DNI, the diabetic patients had a longer time of internment (19.7 days versus 10.2 days, $P < 0.0001$), a major frequency of complications (33.9% versus 8.5%, $P < 0.0001$), in addition to a major frequency of intubations and tracheotomy operations (19.6% versus 6.2%, $P = 0.0123$).

Special attention must be given for the airways maintenance in the patients with DNI and any sign of involvement must be promptly treated.

The tracheal intubation with rigid laryngoscopy may be difficult in these patients for the possibility of distortion in the airways anatomy, tissue rigidity and a limited access to the mouth (11). Thus, the tracheostomy must always be taken into account whenever a difficulty is foreseen, since in such cases attempts of intubation one may end up worsening an already damaged airway (2).

In our study 11% of the patients need airway maintenance, and out of these, two patients were submitted to intubation and 11 to tracheostomy. This result is according to the literature data that indicate the airways obstruction in a sufficient degree to require a tracheostomy operation is present in approximately 12 to 16% of the patients.

Ovassapian *et al* suggest, as a first choice for the airway management in the patients with DNI, the intubation with optic fiber using topical anesthesia, and leaving tracheostomy for cases where fibrobronchoscopy is not available or the attempt of intubations has failed (11).

There was only one death amongst the samples studied, which corresponds to a rate of mortality of about 0.7%, close to the rate found in other studies (6, 7, 8).

In the suspicion of deep neck abscess, the patients must be interned with the establishment of intravenous antibiotic therapy, corticotherapy (where possible), and cares with hydration, analgesia etc.

The initial antibiotic therapy is empiric, with a coverage for gram-positives and anaerobes, depending on the case severity, the most probable focus and the existence of a previous treatment (3).

The therapeutic scheme approved in our service is the first generation cephalosporin association with metronidazol, used in 96 cases (64%). Other schemes were used according to individual need.

There was need for association with surgical draining in 73% of the cases, and, for the others, antibiotic therapy was the sole therapy used. Depending on the literature, the surgical draining is necessary in 10 to 83% of the patients with DNI (2).

Although Mayor *et al* succeeded in 90.32% of the patients with DNI treated exclusively with antibiotic therapy and suggested the exclusive medication treatment may be as efficient as the surgical approach, most authors agree that surgical treatment is indicated for all severe cases.

In this context the classification of the clinical cases according to the severity performed in our work may help to define the adequate treatment for each patient. In our study, the surgical draining is carried out the severity cases II, III and IV always keeping drains in the cavity.

The aspiration may be used for obtaining material for cultures, mainly in the patients with risk of infection by atypical pathogens, such as for instance the immunodepressed patients (3).

Conclusion

The deep neck infections complications are potentially fatal and the identification of the main predators of such a conclusion may be difficult. Thus, the definition of the clinical case severity is very important for these patients attention systematization. Therefore, we propose that a severity level classification may help both for the recognition of patients with a higher potential to evolve for complications and the standardization of the therapeutic procedure of the patients with DNI, and then reduce this pathology morbimortality.

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