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DANS CE NUMÉRO

CPRural

The Occasional Nasal Fracture

Fishhook Injury in Eastern Newfoundland

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I was trying to portray the connection between our homes and our environment in this series of paintings - the interconnectiveness of all life....

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All new and improved

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This issue is the start of a new era for the Canadian Journal of Rural Medicine. We have migrated to a new platform, and our look and feel might be a little different than before. What has not changed is our commitment to publish what is of interest to our rural medical readership.

Hopefully, subtle to the reader, but a big change for both authors and editors is the review process. We have a learning curve to overcome on this side. However, I think we become much more transparent with the online manuscript submission system in comparison to the manual system we used before. The authors get quick feedback as to where they stand and what is happening to their paper. In turn, it's much easier for the staff to now know what papers are in what stage of the process. Finally, I get to know what is going to be published in any given issue. Which gives me an option to comment on the journal's content in the editorial. So let's indulge.

In this issue, we will be reading about the quintessential procedure of rural practice. Yup, read about fishhooks and their propensity to find themselves in human flesh, in this study from Newfoundland. While out on the lake this week, I was witness to an acute (luckily managed on the

boat) injury of just this sort. We at the CJRM like this type of article and indeed have previously published the definitive how-to over a decade ago.¹ From this new work, it seems that, although all methods that the Thommasens' describe are used, the 'advance and cut' technique is most favoured on the Avalon Peninsula.

Next is a study from the western end of the country, about the use of a cardiopulmonary resuscitation (CPR) puck to help rural nurses train to provide quality CPR. We do not do CPR often in the periphery, possibly because both rural doctors and nurses are generalists and have to support a wide spectrum of competencies to meet our populations' needs. With CPR outshining every other intervention in cardiac arrest, these devices offer training outside of intermittent (and at times logistically difficult to access) four-letter courses.

Enjoy the renewed CJRM. We welcome all sorts of rural content. If you want to submit a letter to the editor or some other work you can now do it online at <http://www.journalonweb.com/cjrm>.

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1. Thommasen HV, Thommasen A. The occasional removal of an embedded fish hook. *Can J Rural Med* 2005;10:254-9.

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Nouveau et amélioré

Ce numéro est le début d'une ère nouvelle pour le Journal canadien de la médecine rurale. Nous avons migré vers une nouvelle plateforme et avons adopté un nouveau look. Ce qui n'a pas changé est notre engagement à publier des articles d'intérêt sur la médecine rurale pour nos lecteurs.

Dans l'espoir qu'il demeura difficile à discerner aux yeux des lecteurs, le processus d'examen a subi un profond bouleversement auquel les auteurs et rédacteurs doivent s'ajuster. Notre courbe d'apprentissage est vertigineuse. Je suis toutefois d'avis que le système de soumission de manuscrits en ligne nous permet d'être beaucoup plus transparents que le système manuel que nous utilisions auparavant. Les auteurs savent rapidement de quoi il retourne et ce qui se passe avec leur article. En retour, il est beaucoup plus facile pour le personnel de savoir à quel stade du processus en est chaque article. Finalement, je sais à l'avance ce qui va être publié dans chaque numéro, ce qui me donne l'occasion de commenter le contenu dans l'éditorial. Alors, laissons-nous tenter.

Dans ce numéro, nous en apprendrons plus sur la procédure par excellence de la pratique rurale. Eh oui, l'étude de Terre-Neuve nous parle des hameçons et de leur tendance à se retrouver dans la chair humaine. Alors que j'étais au lac cette semaine, j'ai été témoin

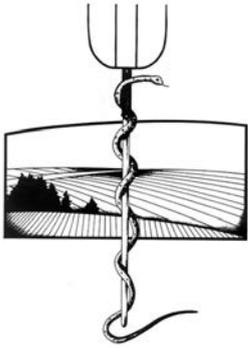
d'une blessure aiguë (heureusement gérée sur le bateau) de cette nature. Au JCMR, nous aimons ce type d'article et avons en effet déjà publié, il y a plus de dix ans, une description détaillée définitive.¹ Selon cette nouvelle étude, il semblerait que, même si toutes les méthodes décrites par Thommasens sont utilisées, la technique « avancer et couper » semble avoir la faveur des résidents de la presqu'île Avalon.

Ensuite, vous lirez une étude en provenance de la côte ouest du pays sur une rondelle de réanimation cardio-respiratoire qui aide le personnel infirmier des régions rurales à s'entraîner à réaliser une RCR de qualité. La RCR n'est pas une manœuvre fréquente en périphérie, peut-être parce que les médecins et le personnel infirmier des régions rurales sont des généralistes et doivent maintenir un large éventail de compétences pour répondre aux besoins de nos populations. Avec la RCR éclipsant toutes les autres interventions dans les cas d'arrêt cardiaque, ce dispositif permet d'offrir une formation hors des cours intermittents dont la logistique pour y accéder est parfois complexe.

Profitez de la nouvelle version du JCMR. Nous acceptons toutes sortes de contenus à saveur rurale. Si vous souhaitez envoyer une lettre au rédacteur ou d'autres articles, vous pouvez maintenant le faire en ligne à <http://www.journalonweb.com/cjrm>

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1. Thommasen HV1, Thommasen A. The occasional removal of an embedded fish hook. *Can J Rural Med.* Automne 2005;10:254-9.



President's message. R-E-S-P-E-C-T

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This summer, we lost Aretha Franklin. Her hit song, R-E-S-P-E-C-T, became a powerful anthem with strong ties to the civil rights and feminist movements.

Recently, issues related to respect have surfaced in discussion on the RuralMed listserv. There has been discussion of interactions between rural docs and consultants when the services of the consultant are needed for emergency patients. Some rural physicians have had telephone interactions where they felt that there was not a good understanding of their limitations of resources, and their medical decisions were judged to be inadequate.

There was also discussion of how, as rural physicians, we need to learn to value ourselves and our families so that we can set some limits on our medical commitments. We work in relatively

small groups and are called upon to assume many roles, both medical and administrative. It is important that we remain cognizant of balance. We need to conserve the energy needed to nurture our most important relationships—those with our families and close friends.

The Society of Rural Physicians of Canada has several initiatives that can help with the challenge of respect. First, the RuralMed listserv allows SRPC members to discuss these issues and to exchange ideas with their rural colleagues. At our yearly Rural and Remote conference, workshops are led by rural doctors who share their practical experience and knowledge with their colleagues. We are aware that doctors who work in similar environments as we do are most aware of our challenges and are excellent teachers.

The SRPC executive is involved in initiatives with other Canadian medical organizations to increase understanding and promote rural practice. We have worked with the College of Family Physicians of Canada on the Rural Roadmap¹ and are continuing to implement its recommendations. For example, Action 6 of the Rural Roadmap is to... “Support the Royal College of Physicians and Surgeons of Canada in identifying and equipping specialists with generalist competencies required to support rural communities.”

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The SRPC is also a member of the Canadian Medical Forum, a forum of 10 medical organizations who meet three times a year to discuss issues of common interest. At our last meeting, we discussed specialist services in rural Canada. We learned that rural rotations are being introduced into Royal College training programs across the county.

The SRPC will continue initiatives that increase the perceived value of rural medicine, as this will invariably improve healthcare services for rural populations.

REFERENCE

1. Available from: https://www.cfpc.ca/uploadedFiles/Directories/Committees_List/Rural%20Road%20Map%20Directions%20ENG.pdf. [Last accessed on 2018 Sep 16].

R-E-S-P-E-C-T

Cet été, Aretha Franklin : la « reine de la soul » nous a quittés. Sa fameuse chanson, R-E-S-P-E-C-T, s'est hissée en un hymne puissant ayant des liens étroits avec les mouvements féministes et de défense des droits civils.

Récemment, des questions liées au respect ont fait surface dans les discussions sur la liste de diffusion RuralMed. Il y a eu des discussions sur certaines interactions entre les médecins en milieu rural et les consultants lorsque les services des consultants sont nécessaires pour les patients en situation d'urgence. Certains médecins en milieu rural ont eu des interactions téléphoniques où ils estimaient que les consultants comprenaient mal la réalité de leurs ressources limitées et que leurs décisions médicales étaient jugées inadéquates.

Nous avons également discuté de la façon dont, en tant que médecins en milieu rural, nous devons apprendre à nous valoriser et à valoriser nos familles afin de limiter nos engagements médicaux. Nous travaillons en groupes relativement petits et sommes appelés à assumer un certain nombre de tâches, à la fois médicales et administratives. Il est important de demeurer conscients de l'équilibre. Nous devons conserver l'énergie nécessaire pour entretenir nos relations les plus importantes, soit celles avec notre famille et nos amis.

La SMRC a mis en place plusieurs initiatives pour aider à surmonter les nombreux défis associés au respect. Premièrement, la liste de diffusion rurale permet aux membres de la SMRC de discuter de ces questions et d'échanger des idées avec leurs collègues des milieux ruraux. À notre conférence annuelle sur les régions rurales et éloignées, les ateliers sont animés par des médecins des régions rurales qui partagent leur expérience pratique et leurs connaissances avec leurs collègues. Nous sommes conscients que les médecins qui travaillent dans un environnement semblable au nôtre sont plus conscients des défis auxquels nous faisons face et sont d'excellents enseignants.

L'exécutif de la SMRC collabore à des initiatives avec d'autres organisations médicales canadiennes afin d'améliorer la compréhension et de promouvoir la pratique en milieu rural. Nous avons travaillé avec le Collège canadien des médecins de famille au Plan d'action pour la médecine rurale¹ et continuons à mettre en œuvre les recommandations. Par exemple, l'action 6 du Plan d'action pour la médecine rurale vise à « Soutenir les efforts du Collège royal des médecins et chirurgiens du Canada pour déterminer les compétences généralistes requises pour répondre aux besoins des collectivités rurales et outiller les spécialistes. ».

La SMRC est également membre du Forum médical canadien. Il s'agit d'un forum de 10 organisations médicales qui se réunissent trois fois par année pour discuter de questions d'intérêt commun. Lors de notre dernière réunion, nous avons discuté des services spécialisés dans les régions rurales du Canada. Nous avons appris que les programmes de formation du Collège royal commencent à offrir des stages en milieu rural partout au pays.

La SMRC poursuivra les initiatives visant à accroître la valeur perçue de la médecine rurale, car cela permettra d'améliorer invariablement les services de santé offerts aux populations rurales.

REFERENCE

1. Accessible à: https://www.cfpc.ca/uploadedFiles/Directories/Committees_List/Rural%20Road%20Map%20Directions%20FRE.pdf. [Consulté le 16 Sept 2018].

Fishhook injury in Eastern Newfoundland: Retrospective review

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Abstract

Introduction: The Canadian island of Newfoundland has a long history of fishing; however, no study to date has developed a regional profile of fishhook injuries on its east coast.

Methods: To this end, we conducted a retrospective review of fishhook injuries at all Newfoundland East coast emergency departments from 2013 to 2015. Patient presentations were reviewed for the date of arrival, sex of the patient, location of fishhook injury, tetanus immunisation status, anaesthetic utilisation, diagnostic imaging, antibiotic management and technique of removal.

Results: Information was retrieved for 165 patients. Most injuries occurred to the hand (80.6%), and out of five documented techniques, "advance and cut" was the most common extraction method (55.5%). There was a high percentage of prophylactic oral antibiotics prescribed (57%) and X-ray imaging (20%) utilised. Consultation was required for 4.2% of the fishhook injuries including consultation to a local fire department service.

Conclusions: On the east coast of Newfoundland, fishhook injuries are addressed inconsistently, with potentially suboptimal methods for removal, coupled with unnecessary imaging and antibiotics. We believe that there is a role for education and other initiatives to improve the care delivered.

Keywords: Fishhook removal, embedded fishhook, fishhook injuries

Blessures d'hameçons dans l'est de Terre-Neuve: Un examen rétrospectif

Résumé

Introduction: L'île canadienne de Terre-Neuve a une longue histoire de pêche. Cependant, à date, aucun profil régional sur les blessures d'hameçons de la côte est à été décrit.

Méthodes: À cette fin, nous avons mené une étude rétrospective sur les blessures d'hameçons répertoriées de 2013 à 2015 dans l'ensemble des départements d'urgence de la côte est de Terre-Neuve. Les données retenues dans cette étude incluent la date d'arrivée, le sexe du patient, lieu de blessure d'hameçon, l'état de l'immunisation antitétanique, l'utilisation d'anesthésie, l'utilisation d'imagerie, la gestion des antibiotiques et les techniques utilisées pour retirer l'hameçon.

Résultats: Les informations ont été répertoriées sur 165 patients. La plupart des blessures s'est produites aux mains (80,6%) et sur cinq techniques documentées, la méthode d'extraction « Avancer et couper » a été la plus couramment utilisée (55,5%). Il y a eu un pourcentage élevé de prescriptions d'antibiotiques oraux données par prophylaxie (57%) ainsi que de radiographies (20%) faites. Une consultation était requise pour 4,2% des blessures d'hameçons, incluant une consultation auprès d'un service d'incendie local.

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Conclusion: Sur la côte est de Terre-Neuve, les blessures d'hameçons semblent être gérées de manière inconsistante, avec des méthodes d'extraction potentiellement sous-optimales et surutilisation d'antibiotiques et d'imagerie. Nous estimons qu'il y a un rôle d'éducation ainsi que d'autres initiatives pour améliorer les soins octroyés aux patients ayant des blessures d'hameçon.

Keywords: Retrait d'hameçon, hameçon accroché, blessures d'hameçons

INTRODUCTION

Newfoundlanders have been entwined with the sea for their livelihood and as a food source for generations. Along with Labrador, the province's rate of recreational fishing is second only to Yukon in Canada.¹ Unfortunately, fishhook injuries are common among recreational anglers;² hooks can catch in the skin (most commonly the hands and head),³ and are challenging and painful to remove since the barb is designed to stay lodged in prey.² While the existing medical literature contains comprehensive reviews highlighting fishhook removal techniques and expectant management,⁴ and several case reports documenting individual fishhook removal,^{2,5,6} few comprehensive reviews of the emergency department (ED) medical management of fishhook injuries exist. In fact, a librarian-guided literature search for all English language articles from 1990 to 2016 using the following search string found only one: (fishhook*[tw] OR "fish hook"[tw] OR "fish hooks"[tw] OR (Fisheries[Mesh] AND hook* [tw])) AND ("Wounds and Injuries"[Mesh] OR wound* [tw] OR injur* [tw] OR remov* [tw]). In 1991, Doser *et al.*⁷ completed a prospective review of the Alaskan sport and commercial fishery with respect to fishhook injuries. In 100 non-randomised, consecutive patients, it was determined that the majority of injuries involved the hand or head, where antibiotic therapy was not deemed essential.

The goals of this study were twofold: (1) to document the management of embedded fishhooks in Newfoundland EDs and (2) to determine if there is an increase in the incidence of fishhook injuries during the limited times when recreational cod fishing ("Recreational Groundfish Fishery") is permitted. Opening dates and duration for the commercial and recreational cod fisheries have been regulated and sporadically approved since the closure of the commercial cod fishery in 1992. More recently, there is a consistent 3-week summer

and 1-week fall recreational food fishery. The goal of this review is to increase physician education surrounding the usage of other (less invasive) fishhook removal techniques and decrease the use of prophylactic antibiotics.

METHODS

Study setting

Newfoundland is the island portion of the easternmost province in Canada, of Newfoundland and Labrador. This study specifically focused on a southeast area of Newfoundland known as the Avalon Peninsula. Healthcare in this area is delivered by the Eastern Health Regional Health Authority.

Study design

This was a retrospective review.

Data retrieval

We extracted patient records from all hospital ED within eastern health for the 3-year period from January 1st, 2013 to December 31st, 2015 inclusive. The area includes the entire Avalon, Burin and Bonavista Peninsulas as well as Bell Island on the east coast of Newfoundland. Records were located by searching Meditech under discharge diagnosis for any one of the following keywords: fish, hook, fishhook and jigger. Date of arrival, sex of patient, location of fishhook injury, tetanus immunisation status, anaesthetic use, diagnostic imaging utilisation, antibiotic management and technique of removal were extracted from the chart and simple descriptive statistics were calculated.

Ethics

This study was approved by the Health Research Ethics Authority and the Research Proposals Approval Committee of the Eastern Health Regional Health Authority.

RESULTS

The records of 173 patients with an ED presentation for fishhook injury, from January 1st, 2013 to December 31st, 2015 were extracted from hospital electronic records. Eight charts were unavailable, leaving 165 or 95.4% available for review.

Age and sex

Average age of patients was 51.2 years with an age range of 6–87 years. 126 (76.4%) males and 39 (26.6%) females presented with fishhook injuries.

Time of injury

The majority of ED presentations (54.5%) for fishhook injuries occurred during the recreational groundfish food fishery. The peak ED presentation for fishhook injuries (47.2%) occurred during the 3-week summer recreational fishery. The 1-week fall recreational fishery accounted for 7.2% of the total of fishhook injuries.

Location of injury

Locations of the 165-fishhook injuries are seen in Table 1. Other specifics to highlight included an absence of fishhook injuries to the eye. Fishhook injuries were bilateral with 86 being right sided and 78 being left sided, with one occurring in the centre of the body. Furthermore, there were four individuals with a fishhook involved in two separate fingers at once.

Table 1: Location of fishhook injuries

Fishhook injury location	n (%)
One finger (excluding thumb)	72 (43.6)
Thumb	33 (20.0)
Hand	28 (17.0)
Arm	8 (4.8)
Face	6 (3.6)
Leg	5 (3.0)
Ear	3 (1.8)
Head	2 (1.2)
Lip	2 (1.2)
Nose	2 (1.2)
Neck	1 (0.6)
Back	1 (0.6)
Foot	1 (0.6)
Finger tendon	1 (0.6)
Total	165

n=165.

Treatment before and after fishhook removal

Table 2 outlines the treatments fishhook patients received. Appropriate tetanus management was noted in a high proportion of patients. None of the patients had documented cellulitis from the fishhook injury, and there was no emergency follow-up by any patient for cellulitis. There was a high rate of X-ray completion (20%) and antibiotic utilisation (56.9%). There were nine different oral antibiotics prescribed with cephalexin being the most commonly prescribed in 68 patients (72.3%). Duration of oral antibiotic was for 1 day to 2 weeks with 1-week duration being the most common in 33 patients. Polysporin was the most commonly prescribed topical in 15 patients. Ketorolac was prescribed to 9 (5.5%) patients and was the most commonly prescribed analgesic. No patients were discharged with prescriptions for narcotics.

Fishhook removal technique

Table 3 outlines the techniques that were used to treat the fishhook injuries as well as their

Table 2: Documented treatments before and after fishhook removal

	n (%)
Tetanus immunisation status	
Given tetanus toxoid booster	111 (67.3)
Not given despite requirement	2 (1.2)
Tetanus up to date	41 (24.8)
Not documented or specified	11 (6.7)
Anaesthetic status	
Given 1% or 2% lidocaine with or without epinephrine	121 (73.3)
Not documented	37 (22.4)
Did not require/declined anaesthetic	7 (4.2)
Additional procedural sedation with intranasal midazolam	1 (0.6)
Diagnostic imaging	
Sent for diagnostic X-ray	33 (20)
Antibiotic usage	
Oral	94 (56.9)
Topical	18 (10.9)
Intravenous	3 (1.8)
Prior to or on discharge	
Given pain medication	19 (11.5)
Sutured	7 (4.2)
Given sling	2 (1.2)
Further consultation	
General surgeon	2 (1.2)
Pediatric surgeon	1 (0.6)
Plastic surgeon	1 (0.6)
Fire department	1 (0.6)

Table 3: Frequency of use of different fishhook removal techniques

Technique	Number of times used (%)
Advance and cut	61 (55.5)
Surgical excision/cut it out	25 (22.7)
Simple retrograde	14 (12.7)
String-yank	9 (8.2)
Needle cover	1 (0.9)

Operational definitions - **Advance**: A method of advancing the hook all the way out through the skin without making an incision. **Advance-and-cut**: The tip of the hook is advanced up through the skin so that the barb can be cut with wire cutters. Once cut, the hook is removed backward through its original path. **Cut it out**: A method in which an incision is made in the skin over the location of the barb, after which the hook is pulled through the incision. **Simple retrograde**: The bend of the hook is held with pliers, and then, a downward pressure is applied to the hook. It is then pulled out parallel to the shank in one swift motion. **The string-yank or string-pull**: A method in which a string is wrapped around the bend in the hook and is pulled parallel to the shank. At the same time, downward pressure is applied perpendicular to the shank at the other end, which disengages the barb and produces a tension that allows the hook to come back through its original path. **Needle cover**: An 18 gauge needle is inserted into the wound with the bevel facing down to cover the barb, after which the needle is slowly removed.

frequency of use. For the 165 patient visits, there were 110 documented removal techniques specified. It is relevant to note that two of the string-yank techniques failed, with one of those failures progressing to retrograde technique and one to advance and cut. Forty-nine (29.7%) of the patients did not have a documented removal technique. The remaining patients were consulted or had fishhooks removed before arrival to the emergency or by the triage nurse.

DISCUSSION

This 3-year retrospective review documented the incidence, specifics and medical management of fishhook injuries on the east coast of Newfoundland (Avalon Peninsula), Canada.

Timing

There was a notable higher incidence of fishhook injuries during the summer recreational ground fish fishery. Since the closure of the inshore commercial cod fishery in 1992, there has likely been a loss of fishing experience and skill. The seasonal recreational ground fish fishery has thankfully continued the legacy and fashioned a sport to a new generation of fishers. The tackle traditionally used, commonly referred to as a “jigger” consisted of two barbed hooks held by lead body; however, current regulations permit only a single hook. Consequently, the preferred



Figure 1: A Potential Culprit! ‘General Practitioner’ fly hook and photo by Gary P. Tanner.

angling gear for most recreational fishers is a hand line or casting rod which includes artificial lures, baited hooks and/or feathered hooks to a maximum of three hooks per line. The significant and increasing number of inexperienced, recreational participants using new gear with multiple erratic hooks may explain the high rate of fishhook injuries documented here. See Figure 1 above displaying traditional fly-fishing hook that may cause fishhook injury.

Location of injury

We documented a similarly high rate of hand injuries; however, a lower percentage of facial injuries than a prospective review of injuries in Alaskan fishery where 80% were commercial salmon fishhooks.⁷ This inconsistency in the proportion of facial injuries may be due a higher risk of facial injuries in commercial fishing activity versus the high proportion of recreational fishers reviewed in this study.

Methods of removal

Multiple methods of fishhook removal techniques are documented in the literature.^{4,8-10} The most common techniques include advance and cut,^{2,7,11} simple retrograde,¹¹ string-yank^{2,10-12} and needle cover.^{2,8,11} Consistent with other studies,⁷ the most common technique documented here was advance and cut. In 1961, Cooke¹² first described the string-yank technique being used by fisherman on St. Vincent’s Gulf in Australia in 1961. This unique and satisfying technique is very dramatic, less traumatic and appears to be underutilised in our catchment area.

With many different techniques, it is generally up to the physician to decide which

may be the best. Choice of the technique is rarely clarified, however, some have recommended that advancing the hook and cutting the barb as the simplest and safest.⁵ The presentation of case reports has attempted to educate practising emergency physicians in the appropriate method and management based on the location, type and depth of the embedded fishhook.^{2,6}

Fishhook removal education and preferences have been evaluated following a simulation-training program for uncomplicated fishhook removal.¹¹ After receiving education on the four most common techniques (simple retrograde, advance and cut, string-yank and needle cover), 88% of physician learners demonstrated successful fishhook removals using all of the techniques except needle cover (47%). Simple retrograde and string-yank technique were respectively ranked first and second as easiest to learn, easiest to perform, causing the least tissue damage and as the overall preferred technique. In this review, both techniques, despite being highly ranked, were the least used. This knowledge will be useful for future physician educational sessions in the catchment areas.

Although retrograde methods seem to be preferred, there may be a higher rate of failure with these methods. In this review, there were two failed attempts with the string-yank method documented. Physicians choosing this method should inform patients of the potential for failure and the need to progress to another more invasive procedure.

Antibiotic usage

In comparison to fishbone injuries,¹⁵ studies show a very low rate of infectious complications after a fishhook injury. Thus, although postremoval wound care is probably a reasonable precaution, oral antibiotics may not be necessary for uncomplicated fishhook injuries to soft tissues as they are less likely to progress to cellulitis.⁷ Despite this observation, in this study, 94 or 57% of patients presenting to ED in Eastern Newfoundland received oral antibiotics. This overprescribing of antibiotics may explain a recent increase in antimicrobial resistance in Newfoundland and Labrador.¹⁴ Further work is essential to educate emergency physicians about the unnecessary prescribing of antibiotics for uncomplicated fishhook injuries.

Diagnostic imaging

Imaging is generally not necessary for foreign body removal if the object is visible such as in the case of fishhooks.¹⁵ In this review, 20% of presenting patients had an X-ray completed that was likely not indicated. There is, therefore, an opportunity to educate clinicians about the limited role for imaging to save health system resources.

Limitations

As this is a retrospective chart review, we were limited to recording information that was recorded in the medical chart. Information relevant to our study was at times missing, most notably the fishhook removal technique in 29.7% of the patient charts. Finally, although we strongly believe that the high rate of imaging and antibiotic use suggests a degree of inappropriate use, we made no attempt to judge the appropriateness of treatment and investigations ordered for individual patients.

CONCLUSIONS

We observed a high rate of use of potentially suboptimal methods for embedded fishhook removal, and rates of diagnostic imaging and antibiotic use that also suggests unnecessary use. We believe there is a role for education and other initiatives to improve the care delivered.

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CPRural

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Abstract

Introduction: The purpose of our study was to determine if regular cardiopulmonary resuscitation (CPR) practise improved the quality of nurses' chest compressions in a rural hospital.

Methods: The study was a prospective interventional trial measuring the effectiveness of brief, monthly CPR practice for rural nurses. The quality of nurses' chest compressions was measured before and after monthly practise with an interactive feedback device at the Golden and District Hospital, a rural facility in BC.

Results: All three components of high-quality CPR (depth, recoil and rate) improved significantly.

Conclusion: Monthly practise of chest compressions with an interactive feedback device improved the quality and confidence of nurses' CPR skills. These results suggest that a higher frequency of CPR practice (than the minimum annual recertification) would improve both the quality and retention of CPR skills, specifically for low-volume rural hospitals.

Keywords: Cardiopulmonary resuscitation, cardiopulmonary resuscitation, chest compressions

Résumé

Introduction: Notre étude visait à déterminer si la pratique régulière de la réanimation cardio-respiratoire (RCR) améliore la qualité des compressions thoraciques réalisées par le personnel infirmier dans un hôpital en région rurale.

Méthodes: Il s'agit d'une étude interventionnelle prospective ayant mesuré l'efficacité de la brève pratique mensuelle de la RCR par le personnel infirmier des régions rurales. La qualité des compressions thoraciques effectuées par le personnel infirmier a été mesurée avant et après la pratique mensuelle avec un dispositif interactif de rétroaction à l'hôpital *Golden and District*; un établissement situé en région rurale de la Colombie-Britannique.

Résultats: Les trois éléments de la RCR de grande qualité (profondeur, relaxation et rythme) se sont considérablement améliorés.

Conclusion: La pratique mensuelle des compressions thoraciques avec un dispositif interactif de rétroaction a permis d'améliorer la qualité des compétences en RCR du personnel infirmier et la confiance en ces compétences. Ces résultats laissent croire que la plus grande fréquence de la pratique de la RCR (plutôt que le renouvellement annuel minimal de la certification) améliorerait la qualité et la rétention des compétences en RCR, en particulier dans les hôpitaux des régions rurales à faible volume.

Keywords: Réanimation cardio-respiratoire, réanimation cardio-pulmonaire, compressions thoraciques

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INTRODUCTION

This study examines the quality of nurses' chest compressions when measured before and after monthly practise for 3 consecutive months at a rural low-volume hospital. This paper presents practise guidelines recommended for rural practitioners within low-volume hospitals hoping to improve cardiac arrest outcomes. It is well established that high-quality cardiopulmonary resuscitation (CPR) is a cornerstone of cardiac arrest care and has a direct impact on survival and favourable neurologic outcomes. Certainly, current training and certification methods do not reflect this¹. While yearly CPR recertification is required of nurses, evidence suggests that CPR skills deteriorate within 3 months.^{2,3} Sutton *et al.*⁴ assert that low-dose, high-frequency CPR training improves retention in paediatric providers at a high-volume site. The importance of CPR and the inadequacy of current training methods highlight the need for a more regular and reliable method of ensuring CPR retention and quality in low-volume sites. While studies to date have not demonstrated that real-time use of CPR feedback devices improves survival and favourable neurologic outcomes⁵, they nevertheless have potential as a training tool.

Low-volume sites

Looking specifically at low-volume rural sites posits an even greater need for regular practise. Shin *et al.*⁶ identify that emergency departments with a higher incidence of CPR cases had better outcomes for cardiac arrests than lower-volume sites. An extension of Shin *et al.*'s⁷ conclusion suggests that CPR practice is even more important at low-volume hospitals. Regular practise with a feedback device has the potential to help offset the low incidence of cardiac arrest cases at rural sites, allowing rural practitioners to maintain their skills and confidence.

The majority of studies on CPR quality and education were conducted at high-volume sites and/or teaching hospitals with the inclusion of interactive feedback devices. Limited data exist for low-volume sites with more general practise areas.

Literature review

We conducted a literature review using the search terms

CPR, cardiopulmonary resuscitation, CPR training, CPR retention, audiovisual feedback device, rural hospitals and low-volume sites.

METHODS

Trial design

This project was a prospective interventional trial with the primary endpoint being the effectiveness of brief monthly CPR practice with a visual feedback device.

Participants

All registered nurses (RNs) and licensed practical nurses (LPNs) working on the general inpatient ward and/or in the emergency department at the Golden and District Hospital were eligible for inclusion in this study. Providers were not excluded based on timing of previous CPR training, as this was thought to best represent actual in-hospital conditions.

Quantitative cardiopulmonary resuscitation feedback device

A commercial CPR assessment tool (CPRmeter [Laerdal]) was used to both record CPR quality and to provide visual feedback during training sessions.

Assessment and outcome measures

Using the CPRmeter (with the feedback screen covered), individuals were assessed by study investigators in regards to depth, recoil and rate for 2 min of compression-only CPR at the outset of the trial. Results were reported as the percentage of total compressions during the 2 min that met the American Heart and Stroke Association 2015 CPR guidelines. Before this, the CPRmeter was thoroughly explained to each participant and verbal consent was obtained. Participants were then urged to do a 2-min compression-only CPR session each month with the real-time visual feedback from the CPRmeter. The CPRmeter and a mannequin were left set up in a storage room so participants could access it at any time. Percentages were not recorded

as this practise was self-directed. Participants would then inform the study investigators when they had completed their monthly training. After 3 consecutive months, individuals were again assessed by the study investigators with the feedback screen covered for 2 min of compression-only CPR.

A two-tailed *t*-test for dependent means was used to compare the pre- and post-practise depth, recoil and rate results. This test requires data to be normally distributed, with the scale of measurement being either interval or ratio and the two sets of scores being paired or matched in some way. We used an online calculator, which can be found at www.socscistatistics.com/tests/ttestdependent/Default2.aspx.

Our significance level was predetermined at a $P < 0.05$.

Survey

Participants were also asked to complete an online survey, which was administered near the end of the study.

RESULTS

Participation

In total, we had 18 RNs and LPNs enroll in the study. Two RNs were lost to follow-up (one to maternity leave and one who moved). Both of these nurses had completed all 3 monthly practise sessions, and as such, we opted to include them in our completion calculation. A total of 13 of the 18 nurses (72%) completed all 3 monthly training sessions.

Depth, recoil and rate

The results from the pre- and post-practise testing for 16 nurses that completed both were compared [Table 1].

A mean improvement was observed for depth (22%), recoil (28%) and rate (44%). This difference was statistically significant for depth ($P = 0.0056$), recoil ($P = 0.19$) and rate ($P = 0.0077$).

SURVEY RESULTS

Ten of the 18 nurses in the study completed the survey. Eight of the 10 respondents had

Table 1: Pre- and post-practise results

	Pre-study average (%)	Post-study average (%)	Mean difference (%)	<i>P</i>
Depth	78	99	22	0.0056
Recoil	56	84	28	0.019
Rate	30	68	44	0.0077

increased confidence in their CPR quality from monthly practise. All 10 thought regular CPR practice would benefit their overall skill-set. Eight respondents admitted to not having an accurate perception of their ability to perform CPR before the study and 5 respondents (50%) had actually practised more than once per month. Nine respondents (90%) thought the CPRmeter adequately represented CPR on a person, yet only 5 (50%) said they would be more likely to use the CPRmeter during a real cardiac arrest.

DISCUSSION

Regular CPR practice with interactive feedback tools improves the quality, retention and confidence of nurses' chest compressions in rural hospitals. Brief, high-frequency practise of CPR bridges recertification gaps and provides opportunities for personal practise needs. Oermann *et al.*⁸ agree that CPR practice as brief as 6 min/month could improve psychomotor CPR skills over time. While it is hard to draw firm conclusions from a survey that was completed by only 10 participants, it does seem to suggest that frequent use and familiarity with the CPRmeter generates increased interest in CPR and leads to nurses taking pride in their CPR quality. Familiarity with the CPRmeter is crucial to replicate high-quality CPR in clinical cardiac arrests.

In small rural hospitals, the frequency of CPR is lower in practise, yet no less important in the outcome. Rural hospitals are often underserved and medical personnel work in small teams which means nurses are often doing CPR. Implementing practise recommendations for low-volume sites ensures nurses are adequately prepared to deliver high-quality CPR. This concept is widely recognised in rural settings with the use of simulation to practise lesser-used skills, however, the foundational skill of CPR is often neglected.⁹⁻¹¹

Nurses delivering high-quality CPR contribute to better patient outcomes. Examining successes of higher-volume hospitals reflect differences in individual sites' approach to resuscitation education, care and quality improvement. Girotra *et al.*¹² assert that innovative methods, with the inclusion of simulation and feedback devices, all contribute to improving cardiac arrest outcomes. Edelson *et al.*¹⁵ argue that the use of a feedback device, in combination with debriefing, contributes to improved clinical outcomes represented in higher rates of return of spontaneous circulation. Using interactive feedback devices in rural settings offsets low volume occurrences with frequent, high-quality practise. Rural nurses have diverse skill sets that they are expected to maintain for various practise areas. The use of a feedback device for compressions allows self-directed high-quality practise of basic lifesaving skills. Traditional CPR training and recertification have involved time outside of work, coordinating courses and instructors and for some rural sites, even travel from home. Regular use of the feedback device is a simple and effective way to maintain skills on an individual basis outside of the confines of annual courses.

Study limitations

This study has a small sample size reflective of rural hospitals. Further studies could include and compare a greater number of rural hospitals. Our data do not include clinical outcomes but suggest that increased practise and confidence in CPR will lead to better clinical outcomes. In addition, feedback devices used in actual cardiac arrests provide data to compare between practise and real-time CPR.

A second limitation of this study is that 5 of the 10 nurses who completed the questionnaire (and thus at least 5 of the 18 total nurses) admitted to violating the study protocol by practicing more than once per month. While this protocol violation makes it difficult to conclude specifically that monthly practise improves CPR quality, it does not detract from the conclusion that regular practise improves CPR quality at low-volume sites.

A visual inspection of the raw data reveals a seemingly unusual number of zero per cent scores for rate, which made us question whether in fact the rate data are normally distributed.

CONCLUSION

Implementing regular CPR practice for nurses at low-volume sites reduces gaps between training and fosters confidence in life-saving skills. Increasing the frequency and quality of CPR practice with the use of interactive feedback devices may lead to better cardiac arrest outcomes in low-volume sites.

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The occasional nasal fracture

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INTRODUCTION

Due to its prominence, it is not surprising that the nose is the most commonly fractured bone in the face.¹

³ Blunt facial trauma from contact sports, motor vehicle collisions and violent assaults account for the majority of nasal fracture incidents.¹⁻⁵

As with all presentations to the emergency room, the priorities in treating a suspected nasal fracture are to manage the airway, breathing and circulation. Nasal fractures can herald intracranial trauma and orbital or midface fractures. Careful examination is essential to distinguish between an isolated nasal fracture and more extensive injury.

The diagnosis of a nasal fracture is based on a focused history and physical examination. Most patients will complain of pain, swelling, deformity and epistaxis with or without deformity after facial trauma. It is not unusual for patients to delay presentation to the Emergency Room (ER) in hopes that the swelling and deformity will resolve.⁶

During the physical examination, a step-off defect can be detected by palpating a bony “step” interruption in the smooth contour of the nasal cartilage. Intercanthal distance should be measured for traumatic telecanthus (increased intercanthal distance) to determine the presence of nasoorbital ethmoid fractures.⁴

Normal intercanthal distance ranges are 28–34 mm in adults or approximately the horizontal distance of one eye.⁴ Early identification of a septal haematoma is important as delays in draining them can lead to abscess formation and significant cartilage loss.

WHEN TO IMAGE?

Plain X-rays can be obtained; however, they do not change management. Some otolaryngologists suggest that nasal bone X-rays do not need to be obtained if:

1. Pain and swelling are isolated to the bony bridge of the nose
2. The patient can breathe through each nostril
3. No septal haematoma is present.²

The views for a nasal X-ray, if required, are a lateral view to evaluate the nasal dorsum and an occipitomental view for the lateral nasal walls if the above conditions are not met.³ Patients should be referred to a regional centre for computed tomography (CT) scan if concern exists about a more extensive injury in the nasal region or a serious co-morbid head injury.² For instance, an increase in the intercanthal distance suggests a potential naso-orbito-ethmoid fracture, rather than an isolated nasal fracture, and may be associated with a basal skull fracture.²

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UNDISPLACED VERSUS DISPLACED FRACTURES

An undisplaced nasal fracture can be treated conservatively with analgesia and ice.⁵ If evaluated within the first few hours of injury, simple, non-comminuted isolated displaced nasal fractures can be reduced immediately in the ER.^{7,8} The key principle of closed reduction is to apply force opposite to the vector of trauma.^{6,9} Although contention exists surrounding the use of local versus general anaesthesia for preferred means of closed reduction, both methods are found to be effective.⁵

Procedure

1. For local anaesthesia, use 1% lidocaine with 1:100,000 epinephrine. If available, administer spray lidocaine to the fracture
2. Soak nasal packs in lidocaine or cocaine and insert into anterior nasal cavity. Stretched out cotton balls can be used if nasal packs are unavailable. Let sit and allow for the first round of anaesthetic to develop
3. Then, inject 5 mL over the dorsum of the nose from a single skin puncture on the midline dorsum between the eyes [Figure 1]
4. Applying local anaesthetic intranasally can be very helpful if doing a nasal elevation. This is done by injecting both the septum and lateral nasal wall with more lidocaine, using a 30G needle [Figure 2]. Complications of aesthesia can arise if too much volume is injected, which obscures the nasal shape and obscures the reduction¹⁰
5. Following anaesthesia, apply digital pressure to the side that is outfractured and move it medially. Often this will also outfracture the depressed side because the nose is fractured as a single unit
6. If this does not work, inject a small amount of lidocaine inside the nose on the lateral rim.
7. Then, use a Boies' elevator or simply the widest portion of a scalpel handle to apply the outward pressure to elevate a depressed nasal bone [Figure 3]
8. Careful measurement of the intercanthal distance is required, or otherwise, the instrument will apply pressure to the unfractured bone above the fracture. Complications of reduction can include injury to the cribriform plate if the elevator is advanced too far into the nasal vault.¹⁰ Care is also required not to let the instrument inadvertently slip below the lower edge of the nasal bone when applying outward pressure – this can happen very suddenly, leading to a tear in the ala
9. Some force may be required to correctly reposition the bones; this will vary depending on the degree of the fracture.^{9,10} A septal reduction is beyond the scope of an occasional operator and should be done under general anaesthesia
10. All reduced nasal fractures must be splinted following a completed procedure^{6,8-10} [Figure 4].

Nasal fractures with severe septal deformity may be reduced using closed reduction; however, this method alone is unlikely to correct the nasal dorsum and may lead to cosmetic concern.¹¹ Closed comminuted, open comminuted and complicated fractures (fractures involving a haematoma, cerebrospinal fluid (CSF)



Figure 1: (a) Alcohol wipes, 30G needles, 1% lidocaine. (b) 5 ml of 1% lidocaine is injected from a single skin puncture on the midline dorsum of the nose.



Figure 2: (a) Subnasal speculum, Bayonet forceps, nasal packs, gauze, steri strips, nasal cast, spray lidocaine and 30G needle, scissors. (b) Bilateral anterior nasal packing. (c and d) 5 ml of 1% lidocaine is injected intranasally to both the septum and lateral nasal wall.

rhinorrhoea, nerve damage and severe displacement) should be referred to ear, nose and throat (ENT) for appropriate care.¹² If a displaced nasal fracture involves exposure of nasal cartilage, prophylactic antibiotic therapy is necessary.²

CO-MORBID HEAD INJURY AND EPISTAXIS MANAGEMENT

Nasal fractures are often associated with epistaxis. Epistaxis should be managed in the usual manner with persistent bleeding raising the possibility of a posterior bleed.¹³ Sometimes, a bad fracture can cause a bleed from the anterior ethmoid artery. These are difficult to control and often fail conventional packing. Occasionally, a bleed between the cartilage and the septum will form a septal haematoma.² The haematoma should be drained immediately to prevent septal necrosis.² Blunt facial trauma causing a nasal fracture can also cause a co-morbid head injury. Rhinorrhoea suggests a CSF leak² and a basal skull fracture. Fluid can be tested for glucose content or, if mixed with blood, for a halo sign [Figure 5]. Specialised laboratories can test for B2 transferrin, a definitive test for CSF, but this is unlikely to be available in the remote and rural environment.

A suspected CSF leak is an indication for a CT scan of the head if feasible in the rural environment.² Although the majority of CSF leaks resolve spontaneously, contact otolaryngology for further advice if the leak persists for more than 7 days. Patients should be counselled to avoid the supine position to minimise pressure at the site of the dural tear. At this time, the literature does not suggest prophylactic antibiotics for CSF leaks.¹⁴

Conservative treatment has been advocated in cases of immediate-onset CSF rhinorrhoea following accidental trauma, given the high likelihood of spontaneous resolution of the leak.¹⁵ Conservative management consists of a 7–10 days trial of bed rest with the head of the bed elevated approximately 15°–30°. ^{15,16} This angle of inclination is sufficient to reduce the CSF pressure at the basal cisterns. ^{15,16} Coughing, sneezing, nose blowing and heavy lifting should be avoided as much as possible. ^{15,16} Stool softeners should be used to decrease the strain and increased intracranial pressure associated with bowel movements. ¹⁶



Figure 3: Closed reduction. Digital pressure is applied to the outfractured bone. A bayonet forceps handle is used to reduce depressed bone.

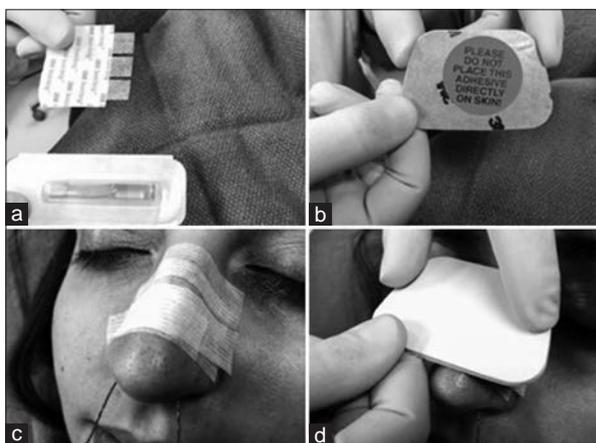


Figure 4: Splinting of a reduced nasal fracture. (a) Steri strips and mastisol. (b) Nasal cast. (c) Mastisol is applied to the skin, followed by steri strips. (d) Soften the nasal cast in warm water and apply over steri strips.



Figure 5: An example of the “halo sign.” Cerebral spinal fluid produces a clear ring around the blood from the nose of a patient who sustained facial trauma. The halo sign should increase suspicion of a basal skull fracture.

DELAYED PRESENTATION

In general, three windows of treatment exist for managing nasal fractures. If the patient presents within a few hours following the injury, reduction can be performed immediately. Often, many hours pass before the patient receives care in an emergency setting. In these cases, swelling in the nasal region obscures a proper physical assessment of the fracture. The next window of treatment occurs 5–7 days following the injury, to allow swelling to subside.⁸ Reduction of a nasal fracture is optimally performed within 2 weeks following the injury before the fractured bones begin to fuse.⁸ If a patient is delayed in seeking medical care past 2 weeks, the nasal bones will begin to heal in the deformed configuration. Surgical interventions to realign and to correct disfigurement can be performed by ENT 3–6 months following the injury.

COSMETIC VERSUS MEDICAL

In addition to functional concerns, nasal fractures are associated with psychological concerns surrounding cosmetic appearance. The primary concern of treatment is ensuring that nasal airways are open and unobstructed. An unreduced septal fracture is the most common cause of residual nasal deformity.⁹ If persisting functional concerns exist, provincial and territorial governments will cover corrective surgical treatment; however, they will not cover cosmetic procedures alone.¹⁷

MANAGEMENT IN CHILDREN

Nasal fractures in children require some special considerations, but otherwise follow general treatment guidelines for adults. A bluish discolouration of the nasal bridge is a common clinical finding in paediatric nasal fractures¹⁸ and should not cause concern. Trauma is less likely to be the mechanism of nasal injury in children; however, special attention should be given to the nasal region as septal injuries are often missed.¹⁰ Similar to adults, closed reduction of displaced nasal fractures is effective in paediatric cases presenting within 2 weeks of the injury. In cases requiring rhinoplasty, age-specific anatomy and facial growth must be considered. Surgery is recommended if the fracture interferes with

nasal airways and breathing or if the deformation of the septum is so significant that regular growth will be impeded. Otherwise, surgical intervention ideally is performed around 16 years of age when growth of the nasal region is complete.^{6,19-20}

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

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Country cardiograms case 65

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This article has been peer
reviewed.

QUESTION

A 69-year-old male patient presents to a remote British Columbia Emergency Room with chest pain. The pain has been intermittently present for approximately 5 days, and he had initially presented 3 days earlier, at which time, an electrocardiogram (ECG) was recorded [Figure 1]. At that visit, his troponin level was negative (<40 ng/L).

He is a lifelong non-smoker, without a family history of premature coronary artery disease. He takes ramipril for elevated blood pressure and takes rosuvastatin for an adverse lipid profile. He is not known to be diabetic. His weight is 100 kg.

He presents now because the pain worsened about an hour ago, with radiation for the first time into the left arm. Vital signs include a pulse of 80/min, blood pressure of 130/80 mmHg, respiratory rate of 16/min and oxygen saturation of 97%. Heart sounds are normal, and the chest is clear to auscultation, with no peripheral oedema evident. Another electrocardiogram is obtained [Figure 2].

The computer interpretation reads: ‘ST elevation – consider anterior injury or acute infarct’. What is your interpretation, and what are the next steps? Is thrombolysis indicated?

For the answer, please see page 25

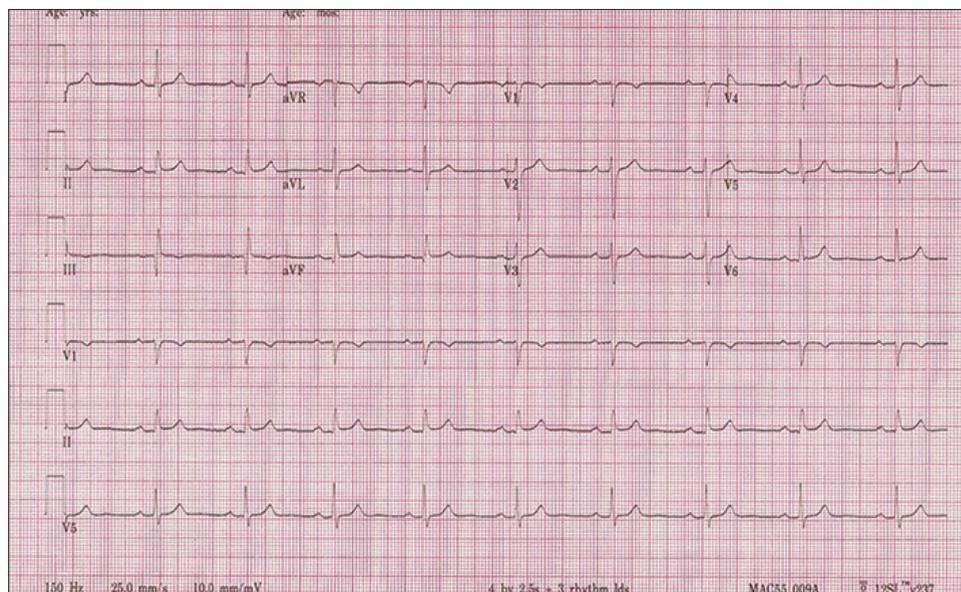


Figure 1: Electrocardiogram recorded 3 days before the day of presentation.

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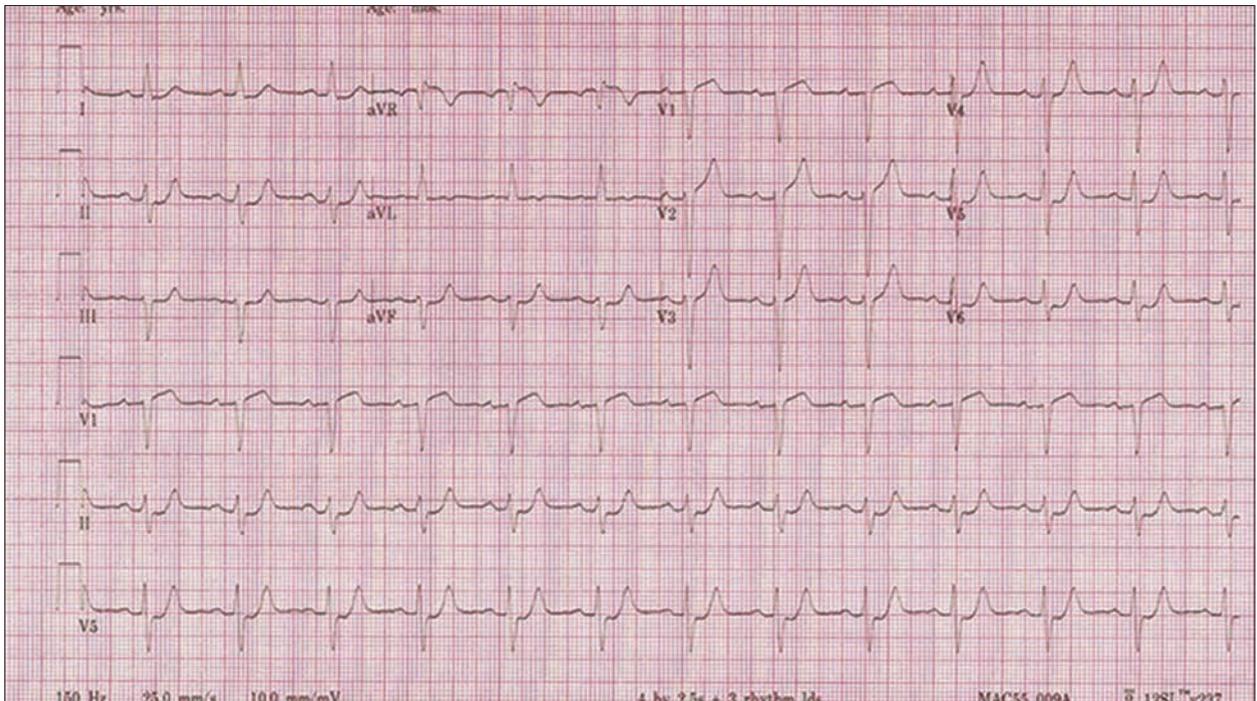


Figure 2: Electrocardiogram recorded during chest pain on the day of presentation.

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CARDIOGRAMMES RURAUX

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Country cardiograms case 65: Answer

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*This article has been peer
reviewed.*

The ECG shown in Figure 1 displays sinus bradycardia, with a rate of 57 beats/min. The PR interval is slightly prolonged (0.215 s), and there is a suggestion of left atrial abnormality in lead II. Otherwise, it appears normal; QRS duration is 0.095 s.

Significant interval changes are evident when comparing Figures 1 and 2. Figure 2 displays normal sinus rhythm at a rate of 77 beats/min. Left axis deviation has developed, with a shift in axis from +40° to -40°. QRS complexes have become wider, with QRS duration now measured at 0.110 s. Slurring of R waves is noted in leads I and aVL, in a pattern consistent with incomplete left bundle branch block (LBBB). ST segments are elevated with a normal contour in leads V1 and V2 and are depressed in leads I, II, aVF, V4 and V5. T waves were previously upright in lead aVL but are now gently inverted.

Given the clinical presentation and ECG findings, an immediate consideration, in a remote ER where transfer times are inevitably long, is whether the ST-segment elevation in V1 and V2 may represent a ST-elevation myocardial infarction (STEMI) and thus may present an indication for thrombolysis. New or suspected-new LBBB was once considered to be an indication for thrombolysis in clinical situations consistent with myocardial infarction. However, this was removed from the 2013 criteria, given its documented low accuracy as a stand-alone ECG finding.¹ In contrast, the significance of a pattern of incomplete LBBB in

such situations is unclear.

This has relevance in this case, where features of a new incomplete LBBB have developed. The ST-segment elevation noted in V1 and V2 can be explained as being secondary to incomplete LBBB and has a non-coved contour that is consistent with this. Given the risks inherent in administering thrombolysis, it would be hard to unequivocally justify its use in these circumstances.

Whereas some of the ST depression seen in Figure 2 can also be explained regarding repolarisation changes associated with incomplete LBBB, its widespread occurrence is unusual and suggests primary ST-segment depression and a possible non-STEMI (NSTEMI). Alternatively, this could be interpreted as possible reciprocal ST-segment depression associated with a STEMI, and hence possibly supportive of a decision to administer thrombolysis. Regardless of the precise diagnosis on the STEMI–NSTEMI – unstable angina spectrum, we interpret the development of a new incomplete LBBB pattern in association with on-going symptoms of chest pain as a strong indicator of an acute coronary syndrome.

A decision on whether or not to administer thrombolysis should not be made on ECG criteria alone but should take clinical context and progress into consideration. In this case, the administration of sublingual nitroglycerine led to a decrease in chest pain symptoms. After conferring with a cardiologist (which included ECG review), we chose not to administer

thrombolysis, and rather to treat this patient with a nitro patch (0.2 mg/h) subcutaneous enoxaparin 100 mg s.c., atorvastatin 80 mg p.o. and clopidogrel 600 mg p.o. (in addition to the Acetylsalicylic acid (ASA) 325 mg that was given on arrival), while preparations were made for an emergency transfer by air to a facility with cardiac catheterisation capabilities. The patient's chest pain symptoms progressively decreased, and he was pain-free at the time of transfer, which was uneventful.

The initial troponin level, performed in our facility, was negative (<40 ng/L). Troponin levels measured after arrival in the receiving hospital were significantly elevated (1600 ng/L), allowing a diagnosis of probable NSTEMI to be made. Coronary angiogram results included significant left main coronary artery disease and extensive triple-vessel disease. Intravenous heparin and intravenous nitroglycerine were commenced, and

the patient was scheduled for urgent coronary artery bypass graft.

In many cases, ECG findings and criteria allow for a straightforward decision to be made on whether or not to administer thrombolysis. In other cases, such as the case, we describe here, such a decision may be more challenging, and rationales can be advanced both for and against thrombolysis. In such cases clinical parameters and response to medications, such as nitroglycerine, can help guide decision-making.

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Conflicts of interest: There are no conflicts of interest.

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For the question, please see page 23

Submissions for Rural Research Poster Presentation

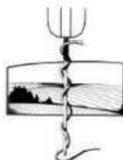
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