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"Absolute Necessity": The Discovery of the Fetal Heartbeat with the Stethoscope, and Its Impact on Obstetric Practice in Dublin and Edinburgh, 1820–1840

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SUMMARY: Many people now take knowledge of the fetal heartbeat for granted. Despite this, it wasn't until 1818, following the invention of the stethoscope and popularization of the technique of auscultation, that the fetal heartbeat was first discovered. Listening to the fetal heartbeat enabled practitioners to confirm the existence of pregnancy, gain information on the internal positions of the fetus and the placenta, and determine the life or death of the fetus in utero. Additionally, signs from the stethoscope provided guidance for practitioners when dealing with long or difficult labors. This article examines the work and writings of the early key players in this story, emphasizing the impact of enthusiastic stethoscope advocacy on Irish obstetric practitioners' uptake of the instrument and how the changes in practice that stemmed from these changes went on to impact practitioners in Scotland.

KEYWORDS: stethoscope, obstetrics, forceps, fetal heartbeat, auscultation, British Isles, material culture

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Hearing the fetal heartbeat is now so commonplace that it is difficult to imagine a time before we were aware of it. Expectant parents await scans during which they will hear the heartbeat, recordings of the sound are used as cultural shorthand for pregnancy, and the sound even appears in some pieces of popular music.[1] We now understand the fetal heartbeat to indicate not just a pregnancy but a *healthy* pregnancy with a living fetus.

The history of how practitioners in the British Isles came to use the stethoscope for obstetric purposes has been little explored. Irish gynecologist J. H. M. Pinkerton has written three articles that provide the initial grounding for the history of the obstetric stethoscope.[2] He named John Creery Ferguson as the first practitioner in Ireland and then the British Isles to use mediate auscultation for obstetric purposes. This article adds further support to this claim while expanding the source base and scope of Pinkerton's study in an effort to provide the broader context in which the stethoscope gained approval in nineteenth-century obstetrical practice.[3] I provide a close reading of the publications by pioneering practitioners who first described their use of the stethoscope to "diagnose" pregnancy and their concerted individual and collective efforts to found a science of fetal auscultation. Without challenging Pinkerton's assertion of Ferguson's pivotal role in introducing fetal auscultation to first Ireland and then Britain, I point

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[1] For example, the sound of the fetal heartbeat is a focal part of the song "Follow Me" by Muse. The sound was taken from a recording of the lead singer's unborn son.

[2] See John H. M. Pinkerton, "Kergaradec, Friend of Laennec and Pioneer of Foetal Auscultation," *Proc. Roy. Soc. Med.* 62, no. 5 (1969): 477–48; John H. M. Pinkerton, "John Creery Ferguson: Friend of William Stokes and Pioneer of Auscultation of the Foetal Heartbeat in the British Isles," *Brit. J. Obstet. Gyn.* 87, no. 4 (1980): 257–60; John H. M. Pinkerton, "John Creery Ferguson (1802–1865) Physician and Fetologist," *Ulster Med. J.* 50 (1981): 10–20; John H. M. Pinkerton, "Evory Kennedy: A Master Controversial," *Irish Med. J.* 77, no. 3 (1984): 77–81.

[3] Pinkerton, "Evory Kennedy" (n. 2), 78.

out that the adoption, and indeed adaptation, of the stethoscope by clinicians influenced by Ferguson is itself a story worthy of historical reconstruction and scrutiny if we are to understand how novel objects like the stethoscope entered mainstream obstetrical practice.

I also seek to consider other early adopters of mediate auscultation in obstetrics alongside Ferguson. As the stethoscope was invented in Paris, it is important to consider the medical context in which René Laennec (1781–1826) practiced, how his efforts differed from the medical context in which British and Irish practitioners were working, and how the latter developed their skill with mediate auscultation, particularly in obstetric practice and while moving between different learning and working environments. I show how these early users of the stethoscope in obstetric practice actively engaged with the instrument as a physical object—a tool for a technique. The clinician's use of, and increased skill with, the instrument would inform design changes that had a broad impact on the style of stethoscope in use across the British Isles.

The obstetric application of mediate auscultation and the stethoscope had an impact on three key parts of obstetric practice in Dublin and Edinburgh, the two cities that form the geographical crux of this article. First, it changed how practitioners diagnosed pregnancy, providing a new set of signs and sounds that practitioners would term "unequivocal" indications of pregnancy. Second, the sounds of the fetus in utero, as well as the placenta, furnished practitioners with new information that they could use to guide treatment and prepare for potentially difficult births. For example, using the stethoscope, practitioners could identify the presence of multiple fetuses well in advance of birth. Third, the use of the stethoscope allowed practitioners to determine the life or death of the fetus before and during labor, information that they could then use as guidance on how best to manage the birth.

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This article begins with an account of Ferguson, who visited Paris and became an advocate for the use of mediate auscultation in both obstetric and nonobstetric practice. When he returned to Ireland, he brought his enthusiasm for the stethoscope home with him, using his connections with the large maternity hospital in Dublin to encourage practitioners there to adopt the instrument. Following his advice, practitioners in Dublin emerged at the forefront of obstetric mediate auscultation in the British Isles. Changes in practice in Dublin, as well as the advocacy, conflict, and conversation that came from these changes, caught the attention of practitioners in Edinburgh. This led practitioners in the Scottish capital to trial the instrument in obstetric settings and become advocates themselves, adopting new methods of diagnosing and aiding the management of pregnancy.[4]

The Process of Developing Skill in Mediate Auscultation with the Stethoscope

The true innovation was not the instrument of the stethoscope but the technique of listening to the internal sounds of the body to draw diagnostic conclusions: the stethoscope was simply an artifact of this technique.[5] The art of listening, and the use of the stethoscope, became a

[4] The term "trial" for testing instruments was not unknown to practitioners at the time and was understood as the practice of testing the stethoscope through repeated use and observing whether the instrument could be reliably used to make accurate diagnoses. For instances of use of the term, see James Clark, *Medical Notes on Climate, Diseases, Hospitals, and Medical Schools, in France, Italy, and Switzerland* (London: Underwood, 1820); John Forbes, *Original Cases Illustrating the Use of the Stethoscope and Percussion in the Diagnosis of Diseases of the Chest* (London: Underwood, 1824); Andrew Duncan Jr., "Contributions to Morbid Anatomy," *Edinburgh Med. Surg. J.* 28 (1827): 302–32.

[5] Jonathan Sterne, "Mediate Auscultation, the Stethoscope, and the 'Autopsy of the Living': Medicine's Acoustic Culture," *J. Med. Human.* 22, no. 2 (2001): 116–17.

"performance" of a practitioner's skill, knowledge, and familiarity with the instrument.[6] Regular use of mediate auscultation with the stethoscope opened up a new, internal world from which practitioners gained information.[7] Importantly, this world was independent of the patient and their will. Symptoms revealed via the sounds of the body could not be concealed nor deceptively framed to the practitioner in the way embodied symptoms explained in verbal testimonies could.[8] The introduction of mediate auscultation redrew the parameters of the doctor-patient relationship, as medical practitioners could choose to bypass the patient's verbal history and instead go straight to the sounds of the body.[9] Practitioners, in turn, needed to develop their ability to hear and correctly interpret the sounds of the body for mediate auscultation to be of diagnostic use to them, which was no small task. The sounds of the body could not intentionally deceive, but they could still be misleading.[10]

In 1794, centers of medical learning in France reopened following a yearlong closure by the revolutionary government.[11] As the government had abolished the previous medical structures and now had greater oversight of hospital organization, the reopened hospitals had to

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[6] Tom Rice, "'The Hallmark of a Doctor': The Stethoscope and the Making of Medical Identity," *J. Material Cult.* 15, no. 3 (2010): 295.

[7] This idea is common among many historians who discuss the stethoscope; see Stanley J. Reiser, *Medicine and the Reign of Technology* (Cambridge: Cambridge University Press, 1978); Jacalyn Duffin, *To See with a Better Eye: A Life of R. T. Laennec* (Princeton, N.J.: Princeton University Press, 1998); Sterne, "Acoustic Culture" (n. 5).

[8] Duffin, *Better Eye* (n. 7)*,* 122; Reiser, *Reign of Technology* (n. 7)*,* 29; Sterne, "Acoustic Culture" (n. 5), 126.

[9] Duffin, *Better Eye* (n. 7)*,* 122; Reiser, *Reign of Technology* (n. 7), 29; Sterne, "Acoustic Culture" (n. 5), 116; Neil Postman, *Technopoly: The Surrender of Culture to Technology* (New York: Random House, 1993), 100.

[10] Sterne, "Acoustic Culture" (n. 5), 126.

[11] Duffin, *Better Eye* (n. 7)*,* 28.

function in an entirely new, centralized way.[12] The new Parisian hospitals had increased capacity, and the centralized system meant practitioners could request patients with specific diseases be moved between hospitals in order to fit a specific research or teaching purpose.[13] In 1798, the French government changed laws in a way that dramatically increased the legal availability of cadavers for medical teaching. These new laws made it legal for practitioners to use the bodies of any patients who died in hospital as anatomical subjects, a change that made between three and five hundred cadavers available to Parisian students per year.[14] The benefits of increased opportunities to dissect and the possibility of observing a large number of cases drew many practitioners from the British Isles to study in Paris.[15] It was within these organizational structures that Laennec invented the stethoscope in 1816.

Practitioners developed skill with mediate auscultation and the stethoscope in the same way as they developed other forms of diagnostic knowledge. Clinicians observed living patients and examined them with the stethoscope, making notes of the sounds they heard and their diagnosis based on those audible signs. This was not an easy or straightforward process, as practitioners needed to know which sounds they were listening to and be confident that they had

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[12] Erwin H. Ackernecht, *Medicine at the Paris Hospital, 1794–1848* (Baltimore: Johns Hopkins University Press, 1967), 33. This centralization brought Paris to the forefront as the undisputed center of France, both politically and medically; this, in turn, meant that many of the major medical events and discoveries occurred specifically in Paris.

[13] Ackernecht, *Paris Hospital* (n. 12), 17. A practitioner who wished to study and teach on diseases of the chest, for example, could formally request that their ward accept only patients suspected of suffering from those conditions and ask that other hospitals send them any patients who had particularly noteworthy cases.

[14] Duffin, *Better Eye* (n. 7)*,* 28; Ruth Richardson, *Death, Dissection, and the Destitute* (Chicago: University of Chicago Press, 2000), 102.

[15] Richardson, *Death,* 102.

identified the sound they were "supposed" to hear. Hearing is a highly individual process, and it is very difficult to describe a sound to someone else, especially working in a relatively loud environment and with sounds that could often be masked by other similar noises of the body.[16] Once practitioners had identified what they thought was the correct sound and made a diagnosis, they could then use one of the forms of verification to either confirm or refute their findings. Each time practitioners reached a diagnosis using the stethoscope and then verified that this diagnosis was correct, they gained confidence in their future ability to make such assessments on the basis of those same stethoscopic sounds. Equally, if the verification revealed their diagnosis was incorrect, practitioners could reassess if they were identifying the sound and correctly correlating those sounds with the pathological anatomy. Between 1821 and 1824, John Forbes (1787–1861)—the physician who translated Laennec's work into English in 1821, drastically altering the content and structure as he did so—examined at least thirty-nine patients with the stethoscope, with varying levels of success. By 1823 he found his diagnoses from stethoscopic signs tended to be successful, having moved from "imperfect" application of the stethoscope in his early cases to increased reports of his diagnoses being "perfectly accurate."[17] It was in late 1823 that Forbes wrote a letter to Laennec apologizing for the "great liberties" he had taken in the first translation, although he maintained that a British audience would not have read a

[16] Examples here could be confusing the sound of the placenta (a "whooshing" or bellows sound) with that of breathing, or of identifying the mother's heartbeat as that of the fetus (though this was rare).
[17] John Forbes, *Original Cases* (n. 4), 267.

translation that was as long as the original French work.[18] He commented that, especially at the start, it was best to expect more erroneous diagnoses than correct ones.[19]

The Obstetric Use of the Stethoscope and Jean-Alexandre Le Jumeau de Kergaradec

The first record of a medical practitioner employing the diagnostic method of auscultation on the abdomen of a pregnant woman came in 1818 when François-Isaac Mayor (1779–1854), a surgeon in Geneva, reported that he had heard the fetal heartbeat.[20] He applied his ear directly onto the abdomen—a technique known as immediate auscultation—of a woman who was only a few days from her due date and declared that he could hear quite distinctly the sound of the fetal heart.[21] The editor of the Swiss periodical *Bibliothèque Universelle* wrote a note on his discovery: "[Mayor] has discovered that one can recognize, *with certainty* whether a child very near to term is living or not, by applying the ear to the mother's belly; if the child is living, one hears the beats of its heart very well, and one can distinguish them easily from the mother's pulse."[22] The fetal heartbeat held a place of particular significance for diagnosing pregnancy,

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[18] Alex Sakula, "Pierre-Adolphe Piorry (1794–1879), Pioneer of Percussion and Pleximetry," *Thorax* 34 (1979): 763; Duffin, *Better Eye* (n. 7)*,* 213. The Musée Laennec, Nantes, holds this letter. I have not been able to visit. Duffin, *Better Eye* (n. 7)*,* gives the most detailed discussion of the letter in the secondary literature. Sakula's "Percussion and Pleximetry" contains a small excerpt of the letter.

[19] Forbes, *Original Cases* (n. 4), xxvi.

[20] "R," "Notices des Séances de l'Académie Royale des Sciences de Paris, Pendant le mois de Juin," *Bibliothèque Universelle des Sciences, Belles-lettres et Arts* 9 (1818): 250. My thanks to Adrian Wilson for providing this translation from French.

[21] Ibid., 250.

[22] Ibid., 250, emphasis original; "belly" translated from the French *ventre*.

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being both one of the clearest sounds available via auscultation and consistent with the established medical belief that the function of the heart was one of the fundamental vital organs.[23] The presence of a heartbeat confirmed the existence of something living, distinguishing the fetus from other sounds in the patient's body. Despite the apparent novelty of the discovery, Mayor did not follow up on his findings nor ever publish any further information on the subject.[24] Rather than Mayor, it was Jean-Alexandre Le Jumeau de Kergaradec (1787–1877)—a French physician and close personal friend of René Laennec—who pushed the obstetric uses of the stethoscope into the metaphorical light. Kergaradec never fought Mayor for priority over the discovery of the fetal heartbeat; indeed he praised and credited Mayor as being the first to use immediate auscultation in an obstetric context.[25] He worked in the large Parisian Lying-In Hospital, formerly known as La Maternité, which boasted a high number of births each year. This provided Kergaradec, his French colleagues, and any foreign students with a large number of patients on whom to develop and practice their stethoscopic abilities on.

In 1822, Kergaradec published a short treatise entitled *Mémoire sur l'Auscultation* on the use of the auscultation and the stethoscope for obstetric purposes. This was the first publication,

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[23] Maria Pia Donato, *Sudden Death: Medicine and Religion in Eighteenth-Century Rome* (London: Routledge, 2014), 145.

[24] René T. H. Laennec, *A Treatise on the Diseases of the Chest: In Which They Are Described According to Their Anatomical Characters, and Their Diagnosis Established on a New Principle by Means of Acoustick Instruments: With Plates*, trans. J. Forbes, 2nd ed. (London: Underwood, 1826); Evory Kennedy, *Observations on Obstetric Auscultation with an Analysis of the Evidences of Pregnancy, and an Inquiry into the Proofs of the Life and Death of the Foetus in Utero* (Dublin: Hodges and Smith, 1833), 59.

[25] Pinkerton, "Kergaradec, Friend of Laennec" (n. 2), 483.

other than the small note on Mayor, that addressed obstetric auscultation.[26] In his treatise, Kergaradec outlined the two sounds that he claimed indicated the presence of a fetus. First was the fetal heartbeat: "Such a considerable lack of isochronism and the very place where the beats were heard did not allow me to regard them as dependent on the mother's heart. It was therefore necessary to recognize that they were produced by the contractions of the fetal heart."[27] Second, he identified the "bruit de souffle," a rushing sound produced by blood moving through the placenta that was subsequently termed the "placental souffle" in English.[28] In hearing this, he was led "to think that the simple pulsations with breathing had some connection with the point of insertion of the placenta into the womb."[29]

Practitioners could interpret these two sounds together as a positive indication of pregnancy. According to Kergaradec, the fetal heartbeat became audible from around the fifth month of gestation and provided a conclusive sign of pregnancy, while the placental souffle could be detected from around the fourth month but, due to its similar sound to that of abdominal tumors, could not be viewed as a conclusive indication without there also being an audible heartbeat.[30] These discoveries led Kergaradec to extol the virtue of auscultation and the stethoscope for diagnosing pregnancy and for detecting both the position of the fetus and the

[26] Jean-Alexandre Kergaradec, *Mémoire sur l'Auscultation Appliquée à l'étude de la Grossesse* (Paris: Méquiquon-Marvis, 1822).
[27] Ibid., 7. On the discovery of the fetal heartbeat. My thanks to Margaret Carlyle for providing this translation from French.
[28] Ibid., 10.
[29] Ibid., 11. On the discovery of the sound of the placenta (trans. Carlyle).
[30] Ibid., 7–11.

presence of multiple fetuses in utero.[31] In the case of "double or multiple pregnancies," as Kergaradec put it, "it is very likely that the double pulsations will be heard in several places in the abdomen. . . . If this conjecture is correct, it will become possible to predict the birth of twins."[32]

Kergaradec's work received a mixed response. There is little evidence available on the immediate response from his French contemporaries, but what there is suggests a frosty reception. Following the publication of Kergaradec's work, Philippe Le Goust, an obstetrician working at the Hôtel-Dieu in Paris, wrote to Kergaradec advising him to stop using the stethoscope—which he described as a "new-fangled and ridiculous plaything"—as it interfered with the training and "sacred" role of the accoucheur (what in France was a surgeon-man-midwife).[33] Other French obstetricians seemed to concur with Le Goust's assessment: Michel Foderà (1793–1848), Joseph Capuron (1767–1850), and Antoine Dugès (1797–1838) denied the value of mediate auscultation and the stethoscope in obstetric practice.[34] Renowned French midwife Marie-Anne Victoire Boivin (1773–1841) did use the stethoscope in her practice; however, it is unclear when she first implemented the instrument into her practice.[35] We do know that Boivin mentioned Kergaradec's work and reports a case where she used the instrument to

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[31] Kergaradec, *Mémoire sur l'Auscultation* (n. 26), 25.
[32] Ibid., 26. On the ability to hear multiple fetal hearts in the case of multiples and the ability to predict the birth of twins.
[33] Pinkerton, "Kergaradec, Friend of Laennec" (n. 2), 483; Duffin, *Better Eye* (n. 7), 211.
[34] François Duchatel, "L'auscultation obstétricale de Philippe Le Goust au monitorage foetal," *Histoire des sciences médicales* 16, no. 1 (1982): 40.
[35] Marie-Victoire Boivin and A. Duges, *Traité des Maladies de l'utérus et des annexes* (Paris: J. B. Baillière, 1833); Georgina Ferry, "Marie Boivin: From Midwife to Gynaecologist," *Lancet* 393, no. 10187 (2019): 2192–93.

diagnose pregnancy in her 1833 book, but this would not put her ahead of the curve compared to other practitioners.[36] In Germany, by contrast, practitioners responded very positively to Kergaradec's work. Bavarian obstetrician Carl Joseph Haus published his own book on the topic in 1823, only a year after Kergaradec first made his investigations public. Other German practitioners, such as Anton Hohl in Halle, Hermann Killan in Bonn, and Hermann Naegele in Mainz, all published further work on the use of auscultation and the stethoscope in obstetric practice.[37]

In the British Isles, the *Quarterly Journal of Foreign and British Medicine* and the *Medico-Chirurgical Review* contained short articles acknowledging Kergaradec's publication in 1822, but little else; there was no effort to publish an English translation.[38] Laennec included a small summary of Kergaradec's findings in an appendix to the 1826 edition of his main treatise on mediate auscultation. Laennec's new edition was subsequently translated into English (1827), with the appendix included.[39] Both Laennec's summary and Forbes' translation significantly altered the works: Laennec gave only a few pages to Kergaradec's forty-three-page book, and

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[36] Boivin and Duges, *Traité des Maladies* (n. 35), 50 and 175. Boivin made no mention of Kergaradec, auscultation, or the stethoscope in her books: Marie-Victoire Boivin, *Mémorial De L'Art Des Accouchemens*, Troisième édition (Paris: Mequignon, 1824), and Maria-Victoire Boivin, *Recherches sur une des causes les plus fréquentes et la moins connue de l'avortement; suivies d'un mémoire sur l'intro-pelvimètre, ou mensurateur interne du bassin* (Paris: J. B. Baillière, 1826).

[37] M. Donald Blaufox, *An Ear to the Chest: An Illustrated History of the Evolution of the Stethoscope* (London: Parthenon, 2002), 65–66. Also see Carl J. Haus, *Die Auscultation in Bezug auf Schwangerschaft* (Wurzburg: S. J. Richter, 1823); Anton F. Hohl, *Die geburtshülfliche Exploration* (Halle: Verlag der Buchhandlung des Waisenhauses, 1833); Hermann F. Kilian, *Operationslehre fur Gebürtshelfe, in zwei Theilan* (Bonn: Eduard Weber, 1834). Only one of the Irish practitioners, Evory Kennedy, acknowledged the work of Haus. None of the other German authors were mentioned by or in other Irish publications.

[38] *Medico-Chirurgical Rev.* (1822): 661–62; *Quart. J. For. Brit. Med. Surg.* (1822): 371–75.

[39] Laennec, *Diseases of the Chest* (n. 24).

Forbes notoriously changed the structure and content of Laennec's *Traité* as he translated it. This incomplete if not rudimentary form of Kergaradec's work nonetheless marked the first time that his findings were available in English.

John Creery Ferguson and the Obstetric Use of the Stethoscope in the British Isles

Irishman John Creery Ferguson (1802–1865) was the first recorded practitioner to use the stethoscope for obstetric purposes in the British Isles.[40] He was a close friend of stethoscope advocates William Stokes and Dominic Corrigan, having accompanied them to Edinburgh in 1824.[41] He disliked the Scottish capital, and soon after arriving with Stokes and Corrigan, he left to spend the next three years in Paris, which, as we have seen, had by this time gained a reputation as Europe's leading medical center.[42] While in Paris, he was impressed by the work of Kergaradec in applying the stethoscope to the abdomens of pregnant women, and while studying under Laennec, Ferguson claimed to have often seen Laennec "practically confirm" Kergaradec's claims.[43] Laennec recorded one practitioner named "Fergusson" who studied under him in 1825. Though the spelling of Ferguson is incorrect, this person was most likely John Creery Ferguson, whose dates in Paris align with Laennec's records.[44]

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[40] John C. Ferguson, "Auscultation, the Only Unequivocal Evidence of Pregnancy, with Cases," *Dublin Med. Trans.* 1 (1830): 64–88. In this work Ferguson wrote about his use of the stethoscope in an obstetric case in 1828. It is likely, based on the work of other practitioners, that there were other instances of practitioners using the stethoscope in obstetric practice, but Ferguson's use is the earliest reported with a specific date.

[41] O'Donel T. D. Browne, *The Rotunda Hospital, 1745–1945* (Edinburgh: Livingstone, 1947), 177.

[42] Ferguson, "Only Unequivocal Evidence" (n. 40), 69.

[43] Ibid.

[44] Pierre Huard, "Les élèves étrangers de Laennec," *Revue d''histoire des sciences* 26, no. 4 (1973): 325.

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Ferguson was a devoutly religious man; his grandfather was incumbent of the Church of Ireland parish of St. Mark, where he grew up, and he practiced his form of Irish Protestantism even when visiting Edinburgh and Paris.[45] Perhaps as a result of his religious convictions, the practice of infanticide particularly concerned him; he referred to it as a "frightful evil" and argued that discovering and announcing a pregnancy greatly reduced the chances that the mother would, or could, resort to infanticide.[46] The stethoscope greatly appealed to Ferguson, as it furnished unequivocal signs of pregnancy that occurred independent of the mother's testimony. He claimed to have discovered around one hundred cases of concealed pregnancy, in all of which the stethoscope enabled him to discover the pulsations of the fetal heart and the sounds of the placenta, thus revealing the condition of the woman.[47] Ferguson noted that all other signs of pregnancy were fallible, equivocal, and deceptive; a range of other health conditions could simulate any of the generally relied upon signs of pregnancy.[48] He suggested that practitioners could consider the audible heartbeat or placental souffle to be infallible evidence of pregnancy, with the lack of those sounds being "at least presumptive" proof of the contrary.[49]

Ferguson's first recorded use of the stethoscope for obstetric purposes occurred in November 1827, shortly after his return from Paris and his formative experience there. He

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[45] Pinkerton, "John Creery Ferguson" (n. 2), 258; Gabriel McDonnell, "Famous Tandragonians: Some Notable People from Trandragee," *"Before I Forget . . ."* 11 (2012): 35–40.
[46] Ferguson, "Only Unequivocal Evidence" (n. 40), 87.
[47] Ibid., 65; Michael Ryan, *A Manual of Midwifery or Compendium of Gynaecological and Paidonosology; Comparing a New Nomenclature of Obstetric Medicine, with a Concise Account of the Symptoms and Treatment of the Most Important Diseases of Women and Children, and the Management of Various Forms of Parturition Illustrated by Plates*, 3rd ed. (London: Renshaw and Rush, 1831).
[48] Ferguson, "Only Unequivocal Evidence" (n. 40), 66.
[49] Ibid., 81.

examined a young woman who claimed not to be pregnant; by use of the stethoscope, he determined that she was in fact around the fifth month of pregnancy.[50] He announced this finding to the patient's sister, making her promise to still support the expectant mother despite having a child out of wedlock.[51] Ferguson stated in his report that the woman did deliver a healthy child some months later, which confirmed his diagnosis, but he felt that this confirmation was unnecessary; a report of hearing the heartbeat and placental souffle should suffice as evidence.[52] He saw another patient in March 1828 and detected the heartbeat "almost instantly."[53] Upon reexamining the patient, he was further able to discover the sounds of the placenta: the woman delivered a healthy child two months later, thus confirming his diagnosis.[54]

In December 1828, Ferguson attended a case and forgot to bring his stethoscope with him.[55] In a testament to the value Ferguson placed on auscultation with the stethoscope, he rolled up a sheet of paper—similar to Laennec's original instrument—in order to auscultate the belly. Additionally, this quick thinking demonstrates Ferguson's initiative and ability in the act of *creating* a makeshift stethoscope to remedy a situation. He stated that the paper version was not as good as his usual stethoscope, but it did enable him to find the fetal heartbeat.[56] The paper version meant that Ferguson could not easily demonstrate the fetal sounds to the (unnamed)

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[50] Ibid., 71–72.
[51] Ibid., 72.
[52] Ibid.
[53] Ibid.
[54] Ibid., 73–74.
[55] Ibid., 74–75.
[56] Ferguson, "Only Unequivocal Evidence" (n. 40), 75. For more on the use of paper as a material tool, see Carla Bittel, Elaine Leong, and Christine von Oertzen, *Working with Paper: Gendered Practices in the History of Knowledge* (Pittsburgh: University of Pittsburgh Press, 2019).

colleague who was also in attendance.[57] Indeed, he reported that the friend was skeptical of his diagnosis until the patient gave birth, after which he wrote to Ferguson stating that "an accouchement has finally confirmed your diagnosis."[58] Clearly, Ferguson had been right, but his friend had demanded the same standards of proof in making the diagnosis that Ferguson himself expected: being able to hear the fetal heartbeat and placental souffle for oneself using the stethoscope had seemingly become the new burden of proof to diagnose a pregnancy.

Ferguson published two papers on his work on auscultation in the *Dublin Medical Transactions*, both in 1830. In the first paper, Ferguson extolled the virtue of mediate auscultation and the stethoscope in the diagnosis of diseases of the thorax, indicating that obstetrics was not the only area in which he used it.[59] He stated that his examples, two cases of pulmonary apoplexy, clearly demonstrated the "value, nay, the necessity of a stethoscopic examination, to the formulation of an accurate diagnosis."[60] He acknowledged that many of his fellow practitioners were already investigating "zealously and successfully" the applications of mediate auscultation in relation to diseases of the thorax.[61] Ferguson lamented that he had not yet seen even those who more generally studied midwifery discuss the use of auscultation in obstetric practice, especially when they "must, by necessity, have a much more extended field of observation" than he did.[62] Ferguson acknowledged that a large number of cases aided the

[57] Ferguson, "Only Unequivocal Evidence" (n. 40), 76.
[58] Ibid., 76.
[59] John C. Ferguson, "Two Cases of Pulmonary Apoplexy, Illustrative of the Value of Mediate Auscultation," *Dublin Med. Trans.* 1 (1830): 18.
[60] Ibid., 18.
[61] Ferguson, "Only Unequivocal Evidence" (n. 40), 64.
[62] Ibid., 65.

process of learning the technique of mediate auscultation and using the stethoscope; increased observation of pregnant patients provided more opportunities to both try the stethoscope and see firsthand the verification of the diagnosis.

Between 1821 and 1835, the design of the stethoscope underwent a variety of modifications, with different practitioners from across the British Isles and Continental Europe offering up their own "improved" versions of the instrument.[63] Laennec's first stethoscope took the form of a long cylindrical tube, with a removable cone shaped piece at the end that he placed on the patient.[64] The design changes ranged from simply making the instrument shorter to completely altering the material, length, and width and occasionally adding extra parts.[65] The majority of these modifications seemed to arise from clinicians' practical considerations, such as weight, cost, ease of transportation, and comfort.[66] Practitioners regularly stated their motivation for changing the design was simply to increase usage of the instrument.[67] There is no evidence that practitioners patented their designs; they published books on mediate auscultation, which

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[63] For more on the changes in stethoscope design, see Peter J. Bishop, "Evolution of the Stethoscope," *J. Roy. Soc. Med*. 73 (1980): 448–56; Blaufox, *Ear to the Chest* (n. 37); Caroline Avery, "Importing the Stethoscope: The Uptake of Mediate Auscultation by British Practitioners, 1816–1850" (Ph.D. diss., University of Leeds, 2021).

[64] René T. H. Laennec, *Traité de l'Auscultation Médiate* (Paris: Chaudé, 1819).

[65] For specific examples, see the very simple Billing stethoscope (Archibald Billing, *First Principles of Medicine*, 2nd ed. [London: S. Highley, 1837]) and the multipart Piorry stethoscope (Pierre A. Piorry, *De la Percussion Médiate et des Signes Obtenus à l'Aide de le Nouveau Moyen d'Exploration, dans les Maladies des Organes Thoraciques et Abdominaux* [Paris: Chaude et Bailliere, 1828]).

[66] Avery, "Importing the Stethoscope" (n. 63), chap. 4.

[67] Ibid. For primary sources discussing their reasons for making changes to stethoscope design, see Charles J. B. Williams, *A Rational Exposition of the Physical Signs of the Diseases of the Lungs and Pleura* (London: Churchill, 1828); N. P. Comins, "Flexible Stethoscope," *Lancet* 12 (1829): 685–87; D. Fox, "Stethoscope with Elastic Ends," *Lancet* 12 (1830): 509–10; Thomas Dodgson, "Advertisement," *Leeds Med. Intelligencer*, May 19, 1831, 79; Billing, *First Principles* (n. 65).

contained new design ideas, but they encouraged readers to go to their maker of choice and seemingly made no profit from the designs themselves.[68] By the 1840s, a singular dominant design emerged that was half the length of Laennec's original and had a much thinner stem (making it lighter and cheaper to make and carry) as well as having a large ear plate for practitioners to press against their ears and a small funnel at the patient end with smooth edges (making it more comfortable for both practitioner and patient). This dominant design was referred to in medical catalogs as the "Ferguson" stethoscope.[69] Unlike with other design changes, no practitioner explicitly claimed priority over this version of the instrument yet, though through trade catalogs the name Ferguson became associated with the popular design.[70]

This design has generally been attributed to the Scottish surgeon William Fergusson (1808–1877).[71] He was a reputed surgeon employed by Queen Victoria and knighted for his

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[68] Avery, "Importing the Stethoscope" (n. 63), chap. 4.

[69] Great Exhibition London, *Official Catalogue of the Great Exhibition of the Works of Industry of All Nations, 1851* (London: Spicer Brothers, 1851); J. Weiss, *A Catalogue of Surgical Instruments, Apparatus, Appliances etc.* (London: M.S. Rickerby, 1863); Maw, S. (and Sons), *A Catalogue of Surgeons Instruments, Air and Water Beds, Pillows and Cushions, Bandages, Trusses, Elastic Stockings, Inhalers, Galvanic Apparatus and Other Appliances Used by the Medical Profession* (London: Maw & Sons, 1866); Arnold and Sons, *A Catalogue of Surgical Instruments Manufactured and Sold by Arnold and Sons* (London: Arnold and Sons, 1873); Down Bros, *A Catalogue of Surgical Instruments and Appliances Manufactured and Sold by Down Bros* (London: Down Brothers, 1885).

[70] Some of these style stethoscopes came with the name engraved on them, but there was no consistency in the spelling of the name between "Fergusson" and "Ferguson."

[71] Victor McKusick et al. "'Harvey Tercentenary': An Exhibition on the History of Cardiovascular Sound Including the Evolution of the Stethoscope," *Bull. Hist. Med.* 31, no. 5 (1957); Peter J. Bishop, "Evolution of the Stethoscope," *J. Roy. Soc. Med.* 73, no. 6 (1980). Accession records of the stethoscope collections from the Wellcome Collection and London Science Museum, 2018. The spelling of Ferguson/Fergusson cannot be relied upon to determine the designer, as the available source materials are inconsistent in spelling.

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services as well as being the chair of surgery at King's College Hospital in 1840.[72] Extracts from his 1848 book *A System of Practical Surgery* suggest that he had used the stethoscope and recognized its value.[73] Moreover, he had been involved with the creation of other metal surgical instruments, which suggests he was inclined toward creating and adapting tools for practitioners. It may seem that Fergusson, a famous practitioner who had a record of creating and altering surgical instruments, would be a more likely candidate for the new stethoscope design. Certainly, eminent physician Victor McKusick, historian Peter J. Bishop, and the archivist records at the Wellcome Collection and London Science Museum have previously assumed this to be the case.

Yet despite William Fergusson's track record and skill in creating instruments and his acknowledgment of the stethoscope, his surgical interests were primarily focused on "conservative" surgery—the prevention of limb loss—and on surgery related to knee joints.[74] These areas of surgery rarely if ever required the use of the stethoscope. In *Practical Surgery*, he mentioned the stethoscope only twice, once for diagnosing aneurysms and once for use in tracheostomies, neither of which were his main surgical interests.[75] There is little to suggest William Fergusson used the stethoscope regularly enough to be interested in adapting the instrument. Furthermore, as Fergusson was such a high-profile practitioner, we would expect his new and innovative stethoscope design to be commented on either by himself or in medical journals and periodicals: He put his name on his other surgical instruments, why would he not

[72] O*xford Dictionary of National Biography*, s.v. "Fergusson, William."
[73] William Fergusson, *A System of Practical Surgery* (Philadelphia: Lea and Blanchard, 1848).
[74] William Fergusson, *Lectures on the Progress of Anatomy and Surgery during the Present Century* (London: Churchill, 1867).
[75] Fergusson, *System of Practical Surgery* (n. 73), 138, 441.

publicize his involvement with the stethoscope? It seems instead that William Fergusson rarely used the stethoscope due to his other surgical interests and did not claim the design, as he had done with his other instruments. This leads me to conjecture that McKusick, Bishop, the Wellcome records, and the London Science Museum records are incorrect in their attribution of the new stethoscope to William Fergusson, misled perhaps by Fergusson's general influence in the British medical sphere.

John Creery Ferguson is a strong contender for being the originator of the "Ferguson" stethoscope. He had visited the medical schools of Paris, unlike William Fergusson, and became a strong early advocate for the instrument. Additionally, there is a wealth of evidence that John Creery Ferguson simply spent a very large amount of time tinkering with the stethoscope. Ferguson regularly used the stethoscope in his medical practice in Dublin, both in obstetric examinations and for the thorax.[76] Additionally, he worked closely with Dominic Corrigan, another Irish stethoscope advocate, on the sounds of the heart and arterial impulses, and he conducted some small experiments using the stethoscope on pregnant animals.[77] John Creery Ferguson regularly used the stethoscope, made efforts to teach its uses to others, and played an active part in ongoing research into its use in obstetrics and cardiology. This makes him the most likely candidate for being the practitioner who created the "Ferguson" stethoscope: the design that became the standard model in Britain due to its affordability, portability, and high level of comfort.[78] The Ferguson stethoscope had an impact not just on Irish obstetric practice but on

[76] Ferguson, "Only Unequivocal Evidence" (n. 40), 65.
[77] Ibid., 72.
[78] For more on this, see Avery, "Importing the Stethoscope" (n. 63), appendix 2.

stethoscopic practice in the British Isles and farther afield by making the instrument cheaper and more comfortable to use.

The Ferguson design of the monaural stethoscope remained mostly unchanged until French obstetrician Adolphe Pinard (1844–1934) introduced a new obstetric stethoscope in 1876.[79] The instrument is generally made of wood and around eight inches long, with a large ear plate attached to a flaring cone. While the cone part is wider than the Ferguson model, the two designs are not dramatically different. Pinard mentioned the design in his 1899 book *Clinique obstétricale*, though he did not describe it in any detail.[80] It is unclear what role Pinard played in the creation of the stethoscope that bears his name; he never published further details on how or why he made the design change.[81] The Pinard design from 1876 remains part of midwifery kits to this day, which is a testament to its staying power as well as the seeming technological "simplicity" of the stethoscope.

Diagnosing Pregnancy with Mediate Auscultation

If John Creery Ferguson was the first practitioner to publish his investigations into Kergaradec's work in the British Isles, he was by no means the last. Obstetricians Robert Collins (1800–1868), master of the Rotunda in Dublin (1825–1833), and his assistants William O'Brien Adams (n.d.) and Evory Kennedy (1806–1886) were some of the earliest adopters of the stethoscope in

[79] Blaufox, *Ear to the Chest* (n. 37), 65; Peter M. Dunn, "Adolphe Pinard (1844–1934) of Paris and Intrauterine Paediatric Care," *Arch. Dis. Childh. Fetal Neonatal Ed.* 91, no. 3 (2006): F231–32.
[80] Adolphe Pinard, *Clinique obstétricale* (Steinheil: Paris, 1899); Blaufox, *Ear to the Chest* (n. 37), 65.
[81] Blaufox, *Ear to the Chest* (n. 37), 65.

obstetric practice in Britain.[82] They had access to a significant amount of clinical material to test this new means of examination and sponsor the development of skills with the instrument. The Dublin Lying-In Hospital was founded in 1745, later renamed the Rotunda, a large maternity hospital that saw an average of 2,300 births per year.[83] Another, smaller institution named the Coombe Maternity Hospital was founded in Dublin in 1826, but it could not compete with the Rotunda in terms of the number of patients seen.[84] During Collins's time as master, practitioners at the Rotunda recorded 16,645 deliveries.[85] Collins noted that this high volume of patients provided him with "abundant means" of testing the ideas, including mediate auscultation, which he later presented in his 1835 book *A Practical Treatise on Midwifery*.[86] Pinkerton has suggested that, due to their geographical closeness and overlapping social circles, Ferguson must have passed on information about the stethoscope to Collins, Adams, and Kennedy at the Rotunda.[87]

Kennedy, who had also visited Paris around 1827, outlined the difficulties practitioners faced in diagnosing pregnancy from well-known symptoms, bemoaning the lack of discussion

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[82] Browne, *Rotunda Hospital* (n. 41), 178. Biographical details for William O'Brien Adams remain elusive, except that he may have been born in 1804 (Hugh Montgomery-Massingberd, *Burke's Irish Family Records* [London: Burkes Peerage, 1976], 907).

[83] Browne, *Rotunda Hospital* (n. 41), 4.

[84] Ibid., 40.

[85] Robert Collins, *A Practical Treatise on Midwifery, Containing the Results of Sixteen Thousand Six Hundred and Fifty-Four Births, Occurring in the Dublin Lying-In Hospital, during the Period of Seven Years, Commencing November 1826* (London: Longman, Rees, Orme, Browne, Green and Longman, 1835), ii.

[86] Ibid., ii.

[87] Pinkerton, "John Creery Ferguson" (n. 2), 258; Pinkerton, "Evory Kennedy" (n. 2), 78. Ferguson and Kennedy were both friends with fellow Irish stethoscope advocate William Stokes.

around obstetric auscultation and its use for diagnosing and managing pregnancy.[88] He was particularly frustrated with what he felt was a lack of interest in the obstetric use of the stethoscope when he saw that practitioners in other areas of physiological and pathological investigation were reporting good results with auscultation and the stethoscope.[89] Kennedy stated that every medical man "knows how often he is required to give an opinion in cases of doubtful pregnancy," and the ability to do so with confidence increased the practitioner's reputation.[90] He pointed out how many of the traditional symptoms of pregnancy—loss of period, darkening of the areolas, sickness, presence of a bump, and quickening of the infant—could all come from a range of other causes, even when they appeared in conjunction.[91] Kennedy accepted that, generally, by the fourth or fifth month, the usual signs of pregnancy would be clear enough to leave practitioners in little doubt of the state of the woman. He claimed, however, that there were, and always would be, a few cases where even the most experienced practitioners could verify their diagnostic suspicions only by the birth (or not) of a child.[92] Kennedy acknowledged that the heartbeat was the most clear and decisive sign of pregnancy, but he devoted a lot of attention to the sounds of the placental souffle as an additional means of its positive diagnosis.[93] He explained that "the first indication of pregnancy afforded by auscultation is the souffle," which was in keeping with the kinds of burden of proof established by his contemporaries who

[88] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 3; Pinkerton, "Evory Kennedy," 78. No exact dates are given for Kennedy's time in Paris, nor any information on if he studied with Kergaradec.
[89] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 3.
[90] Ibid., 1.
[91] Ibid., 3.
[92] Ibid., 109.
[93] Ibid., 106.

also advocated for the use of the stethoscope in obstetrics.[94] When it came to determining if the patient was pregnant or not, Kennedy stated that the "simple application of the stethoscope" would immediately decide the diagnosis, pregnant or otherwise.[95]

For all of the Irish and British clinicians who diagnosed pregnancy using the sounds heard through the stethoscope, there was clearly at least one who found fault in the purported sounds. Fellow Irish physician David Nagle fundamentally disagreed with Kergaradec, Ferguson, and Kennedy that any practitioner could or should rely on the placental souffle, specifically, as a sign of pregnancy.[96] He did not think the placental souffle existed and argued that it could easily be confused both for other sounds in the body or be caused by the presence of an abdominal tumor; he presented an example from 1830 in which that had been the case.[97] Despite Nagle's general disagreement, along with his belief that Ferguson was unqualified to comment on matters of midwifery, he did agree that auscultation could furnish the only *true* sign of a pregnancy with a live fetus: the heartbeat.[98]

Nagle was not the last obstetrician to question the use of the stethoscope in obstetrics. Following Kennedy's claims, renowned Scottish physician and cofounder of the Edinburgh Lying-In Hospital James Hamilton (1767–1839) made it clear that he was firmly against the use of the stethoscope as a means of diagnosing pregnancy. He specifically named and disagreed

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[94] Ibid., 106.
[95] Ibid., 106.
[96] David C. E. Nagle, "On the Use of the Stethoscope for the Detection of Twins in Utero, the Presentation of etc.," *Lancet* 15 (1830): 396.
[97] Ibid., 399.
[98] Ibid., 501.

with Kennedy and stated that "since the publication of Dr Evory Kennedy's book" his attention had been "particularly directed" to the subject of the obstetric use of the stethoscope.[99] He argued that after the fifth month, there was no need for auscultation as a means of diagnosing pregnancy; the traditional symptoms would be sufficient.[100] Hamilton stated that he felt a deep conviction that there must be some fallacy in the observations of those who claimed to be able to use the stethoscope to detect the fetal heartbeat.[101] Furthermore, the level of debate that he observed among practitioners who otherwise *agreed* on the meanings of diagnostic signs from the stethoscope meant that he could not help but be skeptical of these new claims.[102] It is notable that there is little evidence that Hamilton attempted to use the stethoscope in obstetric practice himself. He asked his friend and fellow Edinburgh obstetrician John Moir (1808–1899) to repeat Kennedy's experiments using ten cases between August and September 1833 at the Edinburgh Lying-In Hospital.[103] Moir noted that while he sometimes found it difficult to locate the heartbeat, he was able to do so and each patient delivered living children shortly after his examinations.[104] From these observations, Moir became confident that there was an audible fetal heartbeat that practitioners could locate by means of the stethoscope and it was a strong, if perhaps not infallible, indicator of pregnancy.[105] Unlike Hamilton, Moir repeatedly practiced

[99] James Hamilton, *Practical Observations on Various Subjects Relating to Midwifery* (Philadelphia: Waldie, 1837), 49–50.
[100] Ibid., 49.
[101] Ibid., 49.
[102] Ibid., 49.
[103] Ibid., 50–51.
[104] John Moir, "Appendix," in Hamilton, *Subjects Relating to Midwifery* (n. 99), 100.
[105] Ibid., 100.

listening to the sounds afforded by the stethoscope, making a diagnosis based on those sounds, and then awaited verification in the form of the birth (or not) of a living infant. After conducting the trial of the instrument for Hamilton, Moir continued to use the stethoscope on other patients at the Edinburgh General Lying-In Hospital and reported that he had similar results for all of them.[106] In one case, Moir reported that he had initially heard the fetal heartbeat and then been unsuccessful in replicating this in future examinations; he had his findings both confirmed and refuted when the woman delivered twins a few months later: one living, the other stillborn.[107]

Similarly, Edinburgh obstetrician William Johnson (n.d.) criticized Adams on the use of the stethoscope in obstetrics, complaining that Adams's publications were too vague, as he had assumed that the use of the stethoscope was "already quite familiar to every practical accoucheur," something Johnson was quick to claim was *not* the case.[108] Writing in 1833, a full decade after Kergaradec published his *Mémoire*, Johnson claimed that "few, very few, have used the stethoscope with such an object"—the object being the use of the stethoscope to identify the fetal heartbeat in utero.[109] Johnson was employing the stethoscope in some of his practice, having been trialing the use of the instrument on newborn infants, but "not certainly with the view of applying it to obstetric medicines, as Dr Adams has done, for that was never contemplated."[110] His interest piqued, Johnson then did apply the stethoscope to a pregnant belly

[106] Ibid., 99.
[107] Ibid., 101.
[108] William Johnson, "Strictures on Dr Adams' 'Observations on Mediate Auscultation as a Practical Guide,'" *Dublin J. Med. Chem. Sci.* 3, no. 9 (1833): 312–13.
[109] Ibid., 313.
[110] Ibid., 319.

and said of his findings, "I confess I am still obliged to declare that I hold the evidence of the pulsations of the fetal heart, through the abdominal parietes of the mother, extremely unequivocal."[111]

The instrument trials of Moir and Johnson were the first recorded uses of the stethoscope for obstetric purposes in Edinburgh.[112] This suggests that it was seemingly in response to the claims coming out of Dublin that practitioners in Edinburgh first took an interest in the obstetric use of the stethoscope and then found great use in it. This transfer of instrumental knowledge also required the replication of its use in situ, as clinicians trained themselves to hear the telltale sounds of the pregnant belly.

Aside from Hamilton's outspoken skepticism of obstetric auscultation, even when presented with his own friend's successes, the prevailing discussions were on *which ways* practitioners could best use mediate auscultation, not if it was generally useful. Kennedy even wrote that it was a "shame" that auscultation in obstetric practice had not met with *more* opposition, as it might, ironically, have brought greater attention to the method.[113] He argued that vocal opposition may have encouraged obstetric practitioners to take an interest in trialing the instrument, and it was simply a matter of fact that anyone who took the time to practice with the stethoscope would satisfy themselves of its utility for diagnosing pregnancy.[114]

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[111] Ibid., 319.
[112] Ibid.; Moir, "Appendix" (n. 104).
[113] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 90.
[114] Ibid., 112.

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Discovering Additional Information about the Fetus in Utero

The use of heartbeats and, occasionally, the sound of more than one placental souffle further allowed obstetric practitioners to develop their skill in listening to the pregnant body and correctly interpreting the sounds they identified. Before the adoption of obstetric auscultation, practitioners were able to distinguish between single and multiple fetus pregnancies only during the delivery.[115] In 1830, Nagle and Collins encountered a case where examination with the stethoscope during labor convinced them of the presence of twins.[116] Their conviction was correct, but due to a long and difficult labor, both were stillborn.[117] In this instance, the fact the infants were not born living held no relevance to the verification of the diagnosis: the presence of two fetuses at birth was enough to confirm Nagle and Collins's stethoscopic diagnosis. Collins later encountered another case where he ascertained the presence of twins ninety-six hours before delivery, in this case both children were born living.[118]

In the seven years Collins spent as master of the Rotunda, he recorded four cases of triplets.[119] In each case, he noted the extremely large abdomen of the expectant mother, and in the first case he discovered three fetal heartbeats to be distinctly audible.[120] In this case, all three children, two boys and a girl, were born alive and Collins reported that several years later they were all healthy children.[121] In the latter three cases, none of the children were born living, but

[115] Ibid., 5.
[116] Nagle, "Detection of Twins" (n. 96), 232–33.
[117] Ibid., 233.
[118] Collins, *Practical Treatise* (n. 85), 133.
[119] Collins, *Practical Treatise* (n. 85), 340.
[120] Ibid., 340.
[121] Ibid., 341.

the woman's delivery of three infants still confirmed his diagnosis.[122] Practitioners could observe the patient and, using auscultation, diagnose the presence of multiple fetuses; the number of children delivered at birth would then confirm or refute their diagnosis, building their diagnostic skill. As multiple fetuses increased the danger for both the mother and the children, Collins noted that advanced knowledge of such cases helped both the practitioner and the mother prepare for a difficult labor—something that was not possible before the introduction of mediate auscultation and the stethoscope in Irish obstetric practice.[123] He argued, however, that it was occasionally better to keep the woman unaware of the situation in case her anxiety caused more disruption.[124]

Nagle further used the stethoscope to determine the presenting position of the child or children during labor.[125] He recommended this application to other practitioners, as it provided important information about possible difficult presentations during labor and could aid practitioners in avoiding prematurely causing the patient's water to break.[126] The attending clinicians could more easily maneuver the fetus into a better presentation for delivery with the amniotic fluid still in place; they could also avoid the complications that came with unfavorable presentations, such as breech, which often ended in the death of both mother and child.[127]

Kennedy additionally suggested that the ability to declare with certainty that the child was alive meant practitioners could reassure anxious patients who were worried, with no good

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[122] Ibid., 341.
[123] Ibid., 341.
[124] Ibid., 341.
[125] Nagle, "Detection of Twins" (n. 96), 233.
[126] David C. E. Nagle, "Observations on the Use of the Stethoscope in the Practice of Midwifery," *Lancet* 17 (1831): 449.
[127] Ibid., 449.

reason, that the child had died in utero.[128] He noted that his patients often cited a lack of fetal movement as their reason for fearing the child was dead, but Kennedy assured them (and his readers) that a decrease in movement was not an unequivocal sign of death.[129] He mentioned times when movement appeared to continue despite the child being stillborn, and other instances of movement ceasing, yet the child being born alive and healthy.[130] Only evidence gained through the stethoscope provided certain information on the life or death of the fetus in utero, information that could then alter the course of action followed by the practitioner.

Kennedy made it clear that practitioners who had never managed to find a heartbeat should never use the stethoscope as a method of determining the life or death of the fetus; it would cause only confusion and upset.[131] Furthermore, he urged even those practitioners who were most skilled with the obstetric use of stethoscope not to pronounce certainty of either life or death after only one examination.[132] If a practitioner had previously located the fetal heartbeat with the stethoscope and now, *on multiple attempts* and in a variety of positions on the abdomen, they could not locate it, then they may with relative certainly conclude that the vitality of the infant had ceased.[133] The cessation of the placental souffle further indicated the death of the

[128] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 207.
[129] Ibid., 213.
[130] Ibid., 213.
[131] Ibid., 219.
[132] Ibid., 220.
[133] John T. Ingleby, *Facts and Cases in Obstetric Medicine, with Observations on Some of the Most Important Diseases Incidental to Females* (London: Longman, Reese, Orme, Brown, 1836), 248.

fetus, but it did not always happen when the heartbeat ceased; the cessation of souffle sounds was not a sure indication of death, just as its presence was not a sure indication of life.[134]

In keeping with their ongoing disputes, Nagle ardently disagreed with Kennedy regarding the matter of whether practitioners should or could use the placental sounds as any form of evidence to indicate the life or death of the fetus, as Nagle remained unconvinced that the phenomenon of the placental souffle existed.[135] Nagle furthermore argued that, if these placental sounds existed, it was fallacious to think the character of the sounds could indicate the vitality of the infant.[136] Kennedy responded by accusing Nagle of purposefully misrepresenting his work, pointing out that, in the original passage that Nagle had cut short, he never claimed that practitioners could use the cessation of the souffle alone to indicate the death of the fetus. The full quotation, as Kennedy argued, should have read, "The placental sound, either by ceasing altogether after having previously been heard, or having its character altered, from the continuous murmur with its lengthy sibilous [*sic*] termination, to an abrupt, defined, and much shorter sound *together with the impossibility of detecting the fetal heart's action, particularly if such has been before observed, places the child's death beyond doubt*."[137] While both practitioners thus held that the fetal heartbeat, as heard through the stethoscope, provided vital information regarding the life or death of the fetus in utero, they continued to fundamentally disagree over the use of the placental souffle.

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[134] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 220.
[135] Nagle, "Detection of Twins" (n. 96), 398.
[136] Ibid., 500.
[137] Evory Kennedy, "Obstetric Auscultation: Reply of Dr Kennedy to Dr Nagle," *Lancet* 15 (1831): 496, emphasis original.

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Many illnesses and events could cause the death of the child in utero, including diseases such as smallpox, but without the use of auscultation, what were the general signs that the fetus had died?[138] In most cases, practitioners ascertained the death of the fetus during labor when, after many hours, the uterus began to expel putrid matter. Once this symptom occurred, practitioners assumed that the child had been dead for some time; the death of the child took place well before the practitioner became sensible of that fact.[139] Kennedy suggested that, if the mother's health appeared to be declining, along with the cessation of some of the other signs or symptoms of pregnancy, and the fetal movements had stopped, then these together were strong indications that the child had died before labor.[140] Collins claimed that a practitioner could ascertain the life or death of the fetus "beyond all doubt" by use of the stethoscope: "I know of no case where the advantage of the stethoscope is more fully demonstrated than in the information it enables us to arrive at with regard to the life or death of the fetus, in the progress of tedious and difficult labors."[141]

Managing Instrumental Intervention in Labor and Delivery

In enabling practitioners to detect the continuation or cessation of fetal life, Collins argued the use of the stethoscope was of incalculable benefit, particularly in cases where they may need to consider an instrumental intervention in labor.[142] Irish obstetricians used the practice of mediate

[138] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 204.
[139] Collins, *Practical Treatise* (n. 85), 16.
[140] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 206.
[141] Collins, *Practical Treatise* (n. 85), 16, 18.
[142] Ibid., 225.

auscultation to provide guidance on *when* and *with which instrument* they should intervene, with Adams stating that "by the aid of the stethoscope, we are enabled to determine, with accuracy, whether the time has arrived, which justifies the use of instruments."[143]

Instrumental intervention took four main forms: use of the vectis, use of the short forceps, use of the long forceps, and use of the crotchet and perforator. The vectis and both short and long forceps enabled practitioners to remove the fetus unharmed and were used with that aim in mind, but occasionally they were also applied in order to remove a stillborn infant. In contrast, the instruments known as the perforator and the crotchet destroyed the child, breaking the skull in order to lessen the size, enable its removal, and pull it out—an operation known as a craniotomy.[144] The perforator and crotchet were often used in tandem, with some designs combining the two instruments into one.[145] In a seemingly paradoxical sense, "anti-intervention" practitioners were those who favored the use of the crotchet, as they argued it was the means of removal that was likely to cause less harm to the mother, while practitioners who were more inclined toward intervention advocated for the forceps, which they argued would not cause harm to the mother if employed correctly.[146] Practitioners in Dublin predominantly used the perforator and crotchet or the (specifically) short forceps when they availed themselves of instruments in

[143] William O. Adams, "Observations on Mediate Auscultation, as a Practical Guide in Difficult Labours," *Dublin J. Med. Chem. Sci.* 3, no. 7 (1833): 71.
[144] Walter Radcliffe, *Milestones in Midwifery* (Bristol: John Wright, 1967), 46. The perforator took the form of a hooked knife or scissors used for breaking open the skull or removing obstructing limbs, and the crotchet was used to stick into the fetus in order to pull it down and enable removal.
[145] Ibid., 46.
[146] Hamilton, *Subjects Relating to Midwifery* (n. 99), 33–34.

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labor.[147] In contrast, practitioners in Edinburgh tended to prefer the long forceps.[148] For ease of understanding the following section, table 1 presents a short overview of the main practitioners, their location, and their stance on instrumental intervention in labor.

Name	Location	Position	Interventionist/anti-interventionist
Henrik van Deventer (1651–1724)	The Hague	Physician	Anti-interventionist
John Denman (1733–1815)	London	Physician and man-midwife	Anti-interventionist
Robert Collins (1800–1868)	Dublin	Obstetrician Master of the Rotunda (1825–1833)	Anti-interventionist
Evory Kennedy (1806–1886)	Dublin	Obstetrician Assistant to Robert Collins Master of the Rotunda (1833–1840)	Anti-interventionist
William O'Brien Adams (n.d.)	Dublin	Obstetrician Assistant to Robert Collins	Anti-interventionist
James Hamilton (1767–1839)	Edinburgh	Physician Professor of medicine and midwifery at the University of Edinburgh (1800–1839)	Interventionist
James Young Simpson (1811–1870)	Edinburgh	Obstetrician Professor of medicine and midwifery at the University of Edinburgh (1840–1847)	Interventionist

Table 1. An overview of the main practitioners, their location, and their stance on instrumental intervention in labor.

[147] Collins, *Practical Treatise* (n. 85), 31; Browne, *Rotunda Hospital* (n. 41), 167.

[148] John Burns, *The Principles of Midwifery; Including the Diseases of Women and Children*, 8th ed. (London: Longman, Rees, Orme, Brown, Green and Longman, 1832), 440; Browne, *Rotunda Hospital* (n. 41), 167.

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Debate and discussion regarding instrumental intervention occupied many books and articles written by obstetric practitioners. Most obstetricians accepted that there would always be some cases where they would be required to intervene in a labor using instruments.[149] The number and intensity of these conversations may lead readers to assume that these instruments were being used regularly in the management of birth and labor, but this does not seem to have been the case. Between 1826 and 1833, all of Collins's time as master of the Rotunda, he reported using some form of instrument a total of 145 times, an average of once every 115 births.[150] Collins used a range of publications to compile figures from practitioners across several other cities, including Berlin, Paris, Vienna, and London. He did not include Edinburgh in his statistics, perhaps because practitioners working in the Edinburgh Lying-In Hospital saw only around 150 births per year.[151] The average use of *any* instrument to intervene in labor across all of the locations Collins mentioned was roughly one in every seventy births.[152] This average does not quite tell the full story, however, as there were quite significant differences; in Magdeburg, Germany, practitioners intervened in roughly one in five births, whereas in Paris the intervention rate was closer to one in 183.[153] The type of instrument used, as well as the frequency of use, was also an important factor. Unlike the Irish practitioners who used the crotchet 118 times and the

[149] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 90.
[150] Collins, *Practical Treatise* (n. 85), 31.
[151] W. Fettes, *Address to the Public Respecting the Situation of the Poor of Edinburgh during the Season of Childbearing and Lying-In* (Edinburgh: Murray and Cochrane, 1801), 9; Collins, *Practical Treatise* (n. 85), 32. Bryan Hibbard provides similar figures in *The Obstetrician's Armamentarium: Historical Obstetric Instruments and Their Inventors* (San Anselmo, Calif.: Norman, 2000), 56–57.
[152] Collins, *Practical Treatise* (n. 85), 32.
[153] Ibid., 32; Hibbard, *Obstetrician's Armamentarium* (n. 151), 56.

forceps only 27 times, Collins noted that practitioners in France and Vienna "almost in every instance use[d] the forceps."[154] He warned that the mortality rate at La Maternité in Paris was "so vastly beyond" that of the Rotunda that he could not recommend following their example.[155]

The possibility that religious reasoning played into instrumental decision-making is worth briefly considering. Practitioners in Dublin were undoubtedly seeing a larger number of Roman Catholic patients and a greater influence of the Catholic Church within society, yet the prominent Irish practitioners involved in these discussions were Protestants.[156] France was also a Catholic country and, like Ireland, showed a similarly low rate of intervention per number of births compared to Protestant countries, such as Germany.[157] The difference in the type of intervention, however, adds an extra layer to these considerations. Practitioners in Paris were, over the course of multiple years, much less likely to use instruments to intervene in labor, suggesting that they waited as long as possible to ensure that the child was dead before any potentially harmful interference. Yet they predominantly used the forceps, the instrument designed to facilitate the delivery of a *living* child. Despite sharing nominally similar religious leanings, practitioners in Paris and Dublin seemingly took different approaches to intervention. Moreover, Edinburgh practitioners, working in a predominantly Protestant society, preferred the forceps; the large difference in religious contexts between Edinburgh and Paris did not seem to affect their preferences regarding which instrument to use when intervening in a difficult labor.

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[154] Collins, *Practical Treatise* (n. 85), 29–30.
[155] Ibid. Collins here mentions the work of M. Boivin, although evidently he did not hold her practices in high regard.
[156] See the biographies for Collins, Ferguson, Kennedy, and Nagle.
[157] Collins, *Practical Treatise* (n. 85), 32.

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Dutch obstetrician Hendrick van Deventer (1651–1724), practicing before the introduction of the stethoscope, advocated against any instrumental intervention in the process of labor at all, but he was particularly anti-forceps in his writings.[158] Deventer's work, in relation to posture and the pelvis, made craniotomy more permissible as it suggested that there were some cases where women were simply incapable of delivering naturally, that is, without any form of instrumental intervention to remove the fetus from the uterus or birth canal.[159] Thomas Denman (1733–1815), a prominent English man-midwife in the early 1800s, followed Deventer's teaching and had an aversion to using instruments, instead advocating for obstetric practitioners to avoid instrumental intervention, particularly with the forceps.[160] Collins similarly advocated for delaying intervention until they could be certain of the child's death, then using the crotchet to remove the dead fetus.[161] He regularly referred to the teachings of Denman in his book, using the authority of Denman to support his cautious approach to using the forceps: "I consider the forceps, when used with prudence, a most valuable instrument; but its utility is greatly lessened by the injury so frequently inflicted on the patient, by having recourse to it, where *no* instrument is *necessary*; but *much more so* by using it where, in my mind, it is not only inapplicable but highly dangerous to the patient's safety."[162]

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[158] Adrian Wilson, *The Making of Man-Midwifery: Childbirth in England, 1660–1770* (London: Routledge, 1995), 81.
[159] Ibid., 85–86.
[160] Louise E. Jenkins, "Recovering the Clinical History of the Vectis: The Role of Standardised Medical Education and Changing Obstetric Practice" (Ph.D. diss., University of Leeds, 2019), 110. For more on this, also see Malcolm D. Nichols, *Fixing Women: The Birth of Obstetrics and Gynecology in Britain and America* (Berkeley: UC Medical Humanities Press, 2021).
[161] Collins, *Practical Treatise* (n. 85), 18.
[162] Ibid., 11. Collins footnotes this statement with a lengthy excerpt from Denman, justifying his position.

Perhaps unsurprisingly, both Adams and Kennedy (Collins's assistants at the Rotunda) held similar views to Collins with regard to the use of the forceps. Adams worried that the forceps "even in the most experienced hands, cannot be employed without risk,"[163] while Kennedy stated that the forceps could be an "imminent risk" or even mean "certain destruction" of the parent when used unnecessarily, especially when that use still delivered a stillborn child.[164] He stated that knowing if the fetus was living or dead allowed practitioners to make a decision on using the crotchet instead of using, in his opinion, the ultimately damaging forceps.[165] Thomas M'Keever (1791–1875), the master of the much smaller Coombe Maternity Hospital, stated that "instruments, however ingeniously contrived, however dexterously applied, are still an evil and are only to be thought of with the view of meeting one of still greater magnitude."[166] The comments from M'Keever suggest that Collins and his assistants were not the only prominent Irish obstetric practitioners who were wary of using the forceps. This aligns with the interpretations of previous historians of childbirth, including Bryan Hibbard and Irwin Louden, who noted that Irish and English practitioners tended to be very conservative with their use of the forceps.[167]

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[163] Adams, "Guide in Difficult Labours" (n. 143), 72.
[164] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 229.
[165] Ibid., 229.
[166] Thomas M'Keever, "On the Information Afforded by the Stethoscope in Detecting the Presence of Foetal Life," *Lancet* 20, no. 522 (1833): 715.
[167] Hibbard, *Obstetrician's Armamentarium* (n. 151), 54; Irvine Loudon, "Deaths in Childbed from the Eighteenth Century to 1935," *Med. Hist.* 30, no. 1 (1986): 18–19.

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Collins reported that four mothers died following forceps deliveries, but stated that the deaths were not from "any injury connected to the actual delivery."[168] In the 1830s, maternal deaths were recorded only when there was a live birth; Collins mentioned the number of stillbirths following a forceps delivery but did not state if any of the mothers also died.[169] Causes of death could be "direct," such as blood loss or injury during labor, or "indirect," such as from puerperal fever.[170] Puerperal fever was the leading cause of maternal deaths during the 1800s and into the early 1900s, accounting for over half of all maternal deaths.[171] Despite dedicating a large portion of his book to various observations on puerperal fever—including general comments on the disease, recoveries, and fatalities—Collins did not draw any link between the use of the forceps, or any other instrument, and the occurrence of the illness.[172] The same was true of both Kennedy and Hamilton; neither indicated that they were aware of any potential connection between the use of instruments and incidents of puerperal fever.[173] Collins was concerned with the possible lacerations caused by the forceps, which Hamilton also acknowledged as stemming from "improper" use of the instrument, but not any additional risk of fever.[174]

Hamilton strongly advocated for the use of the forceps and disagreed on moral grounds with any advice regarding delaying interference until evidence from the stethoscope indicated the

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[168] Collins, *Practical Treatise* (n. 85), 15.
[169] Loudon, "Deaths in Childbed" (n. 167), 1; Collins, *Practical Treatise* (n. 85), 15.
[170] Loudon, "Deaths in Childbed" (n. 167), 1.
[171] Ibid., 22.
[172] Collins, *Practical Treatise* (n. 85), 380–459.
[173] Kennedy, *Observations on Obstetric Auscultation* (n. 24); Hamilton, *Subjects Relating to Midwifery* (n. 99).
[174] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 230; Hamilton, *Subjects Relating to Midwifery* (n. 99), 35.

death of the child.[175] He maintained that the forceps, when properly applied, did no harm to the mother; the life of the infant was not relevant to their use, and he argued that Collins's recommendations would prevent practitioners from using the forceps in many cases where it could successfully aid the delivery.[176] Hamilton recommended (and practiced) that intervention take place as soon as the practitioner admitted either the necessity of helping the mother or the impossibility of the infant being born alive without assistance.[177] Hamilton argued that a practitioner ought not to leave a woman in a protracted labor, with no evidence of the child's head advancing, for longer than twelve hours and claimed that the Irish practitioners were allowing women to suffer unnecessarily.[178]

Collins argued that even with the most satisfactory of evidence, the child's death did not warrant immediate intervention; practitioners needed to consider the mother's strength and the state of her physical health.[179] He stated that if natural birth could occur, then it would always be preferable to any means of instrumental removal, and if the practitioner judged that intervention was not necessary for the sake of the mother's health, then they should avoid interfering.[180] M'Keever similarly defended this position, claiming that the number of hours a woman was in labor did not constitute a reason to interfere as long as her health remained stable.[181] Kennedy stated that the view of practitioners like Hamilton—that once the child was dead it would

[175] Hamilton, *Subjects Relating to Midwifery* (n. 99)*,* 33, 51.
[176] Ibid., 35.
[177] Ibid., 51.
[178] Ibid., 33, 51.
[179] Collins, *Practical Treatise* (n. 85), 225.
[180] Ibid., 225.
[181] M'Keever, "Presence of Foetal Life" (n. 166), 715.

necessarily require instrumental assistance for its removal—was outdated.[182] He pointed out that there were multiple cases of practitioners confirming fetal death in utero well before *natural* labor began and many had observed women deliver a stillborn child without practitioners needing to aid the delivery.[183]

This is not to say Irish practitioners never used the forceps, just that they were very cautious in their approach. Collins modified them to create a new form of short forceps in 1830, but even then he recommended that practitioners use them only when they could feel the ear of the infant, indicating that the head was sufficiently low in the birth canal for the safe application of the forceps (a technique advised by Denman).[184] Collins included a case where, by employing the stethoscope, he determined that the child was alive and, in haste, decided to employ the forceps to remove the infant despite the mother not being in immediate distress: the negative impact of the forceps, he claimed, weakened the constitution of the child, and it died twenty-eight hours later.[185] Collins regretted the intervention and considered it to be the cause of the child's death, stating that had he, and the others in attendance, trusted more in the natural powers of the mother's body, then a longer-lived child might have been the outcome.[186]

In contrast, Kennedy reported a case in which the other attending practitioners had, without the aid of the stethoscope, already declared the fetus dead, based on the appearance of

[182] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 206.
[183] Ibid., 206.
[184] Collins, *Practical Treatise* (n. 85), 244; Browne, *Rotunda Hospital* (n. 41), 167.
[185] Collins, *Practical Treatise* (n. 85), 507–8.
[186] Ibid., 508.

fetid matter and meconium (fetal excrement).[187] He used his stethoscope and found that he could hear the fetal heartbeat, at which point he did employ the short forceps; while the child was not breathing at birth, Kennedy was able to revive the infant and, at the time he was recounting the story, he reported the child was now a healthy toddler.[188] Kennedy argued that had he not applied the stethoscope, the child would surely have died either over the course of the labor or at the point when the practitioners brought about removal with the crotchet.[189] In light of this, Kennedy worried about how frequently practitioners may have destroyed or mutilated a viable fetus on the assumption that the child was dead, when in those instances the use of the forceps would have been preferable.[190]

Hamilton argued that if there was reason to call for immediate delivery for the sake of the mother—by forceps *or* crotchet—then the living or dead status of the child would not matter.[191] Collins, on the other hand, argued that for the most part practitioners should not interfere in labor unless they could confirm that the child was dead.[192] Collins worried that practitioners wishing to save the infant, or at the very least not perform a craniotomy on a live child, may delay interfering until the mother was in great danger.[193] Collins understood that waiting for the presence of putrid matter to signify the death of the fetus before intervening greatly increased the

[187] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 242.
[188] Ibid., 242.
[189] Ibid., 242.
[190] Ibid., 229.
[191] Hamilton, *Subjects Relating to Midwifery* (n. 99), 34.
[192] Collins, *Practical Treatise* (n. 85), 18.
[193] Ibid., 18.

chances of puerperal fever and maternal mortality.[194] If the practitioner could be certain that the child was dead, argued Collins, they could deliver before the mother's life became endangered, saving her from hours or days of pain.[195] He recounted numerous cases where the patient endured urgent and distressing labors for over forty hours only to deliver a child that had evidently been dead for hours; furthermore, the act of waiting often brought about inflammation in the mother, a cause of severe illness if not maternal death.[196] These cases occurred before the invention of the stethoscope, but Collins was certain of the immense value information from auscultation could have given in those circumstances.[197]

Kennedy agreed with the view that practitioners ought to intervene in a labor when it was necessary to help the mother, not only when they had evidence that the child was dead.[198] He conceded that the life of the mother ought to take precedence, and cautioned against practitioners aiming too far to preserve the life of both mother and child, ultimately sacrificing them both in the process.[199] Kennedy argued that practitioners could use their knowledge of the death of the fetus to help speed up their decision if intervention with the crotchet was necessary, and to a certain extent it helped to prepare the mother for the loss of the child.[200] Adams further stated that when the mother's health was failing and they had evidence from the stethoscope that the fetus was dead then "the time has arrived, which not only justifies, but demands the scientific use

[194] Ibid., 19.
[195] Ibid., 18.
[196] Ibid., 19–20.
[197] Ibid., 20.
[198] Kennedy, *Observations on Obstetric Auscultation* (n. 24), 227.
[199] Ibid., 229.
[200] Ibid., 227.

of the instruments."[201] Collins made it clear that now he was familiar with the use of mediate auscultation for managing labor and intervention he would have been unhappy to attend any instance of a protracted labor without his stethoscope.[202] While Collins, Kennedy, and Adams were interested in the status of the fetus, it seemed that the information rarely caused them to be more willing to use the forceps in deliveries; instead, it aided them to make more judicious use of the crotchet.

Hamilton's successor, Scottish obstetrician James Young Simpson (1811–1870), writing in 1848, was much more interested in the use of mediate auscultation than Hamilton had been and agreed that the signs from the stethoscope were the best criteria on which modern accoucheurs could properly assess if the infant was living or dead.[203] He noted that even when the death of the infant could be confirmed, no practitioner wanted to perform a craniotomy.[204] Despite this, he still criticized the Dublin practitioners for waiting until the mother was in danger before intervening.[205] In keeping with the opinions of his fellow Scottish obstetricians, Simpson felt it was better to use the stethoscope to confirm the child was still alive and then remove it using the forceps, stating that he had repeatedly found the use of the stethoscope to be an "incalculable benefit" in preserving the lives of both mother and child.[206] Simpson attributed the

[201] Adams, "Guide in Difficult Labours" (n. 143), 68. It is clear in his writing that Adams is specifically talking about the crotchet here.
[202] Collins, *Practical Treatise* (n. 85), 21.
[203] James Y. Simpson, "Memoir on Turning as an Alternative for Craniotomy and the Long Forceps in Deformity of the Brim of the Pelvis," *Provincial Med. Surg. J.* 12, no. 4 (1848): 86.
[204] Ibid., 85.
[205] Ibid., 84.
[206] Ibid., 87–89.

introduction of mediate auscultation in British obstetric and midwifery practices specifically to the practitioners in Dublin.[207]

Conclusion

François-Isaac Mayor did not seem to be aware of how his actions would fundamentally change the practice and understanding of midwifery when, in 1818, he put his ear to a pregnant belly and reported a sound he believed to be the fetal heartbeat. Only a few years later, in Paris, Jean-Alexandre Le Jumeau de Kergaradec would take notice of Mayor's short report of immediate auscultation and combine this action with a new tool invented by his friend René Laennec: the stethoscope. With access to the large maternity hospital in Paris, La Maternité, Kergaradec identified the sounds of the fetal heartbeat and the placental souffle, which he used to diagnose pregnancy and determine the position and number of fetuses in utero. It was within this Parisian context, and under the tutelage of Laennec and Kergaradec, that Irish practitioner John Creery Ferguson first encountered and became enthused by the use of the stethoscope for both obstetric and nonobstetric purposes.

On his return to Dublin, Ferguson was quick to extol the virtues of the use of mediate auscultation with the stethoscope, and despite not being an obstetrician, he continued to use the instrument to diagnose pregnancy when the opportunity arose. His social connections meant that his stethoscope advocacy reached the ears—quite literally—of Robert Collins, the master of the Rotunda, and his assistants William O'Brien Adams and Evory Kennedy. It is possible that

[207] Ibid., 86.

Ferguson's passion for the stethoscope led him to create a design of the instrument that would go on to become the most common monaural style for several decades.

As such, this article is in agreement with Pinkerton that obstetric practitioners in the British Isles were indebted to Ferguson for his promotion of the obstetric use of the stethoscope. However, it also seeks to go a step further and suggest that these same practitioners are also indebted to Ferguson for his design of a lightweight, cheap, and comfortable stethoscope. Moreover, this article has shown that it took a large collective of Irish and British practitioners operating in different cities—from Dublin to Edinburgh—to refine the science of fetal auscultation and find new and exciting applications of the stethoscope in nineteenth-century obstetrics. In so doing, advocates of the stethoscope had entered the larger ongoing debate over instrumental intervention in childbirth. The stethoscope, in turn, could be added to the growing instrumental arsenal available to assist practitioners in managing births. While its introduction into this armature was less controversial than the forceps had been in the seventeenth century, it was no less important in the longer arc of instrumental interventionism.

From their first publications on the topic, the Irish advocates of the obstetric stethoscope praised, explained, and debated their new methods of practice following evidence gained from using the stethoscope. These publications brought the obstetric use of the stethoscope to the attention of practitioners outside of Ireland. Indeed, it was the Scottish practitioner's disbelief of the claims coming from Irish practitioners that ultimately spurred them to test the stethoscope for themselves. This Irish uptake and advocacy is best encapsulated in Collins's statement: "I

cannot, therefore, too strongly impress on the mind of the junior practitioner, the absolute necessity of making himself acquainted with the stethoscope."[208]

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[208] Collins, *Practical Treatise* (n. 85), 21.